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GAME BIRD FARMING.

By AUGUST BADE, Superintendent California State Game Farm.

During the past few years volumes have been written, many conventions held, countless speeches made, and much legislation enacted to save our fast vanishing resources of wild life. On the other hand, with the exception of a few isolated cases, very little has been said or

done toward propagating, in a domestic way, any of the game birds or animals.

When one of our most outstanding exponents of the great game of football was asked what he considered the best defense, he unhesitatingly replied, "A strong offense. If you can keep possession of the ball, you can win." So I believe it is with our game birds. Artificial propagation is the answer: merely helping nature with her work, but in a scientific and businesslike way.

The sole object of the following pages is to set forth, in a clear and concise manner, the more important facts concerning the propagation of game birds, as they have come to us through years of patient work. Experience is not only the best teacher, but the lessons thus learned are far more apt to remain with us and prevent the recurrence of previous mistakes. These lines are to lend encouragement to those

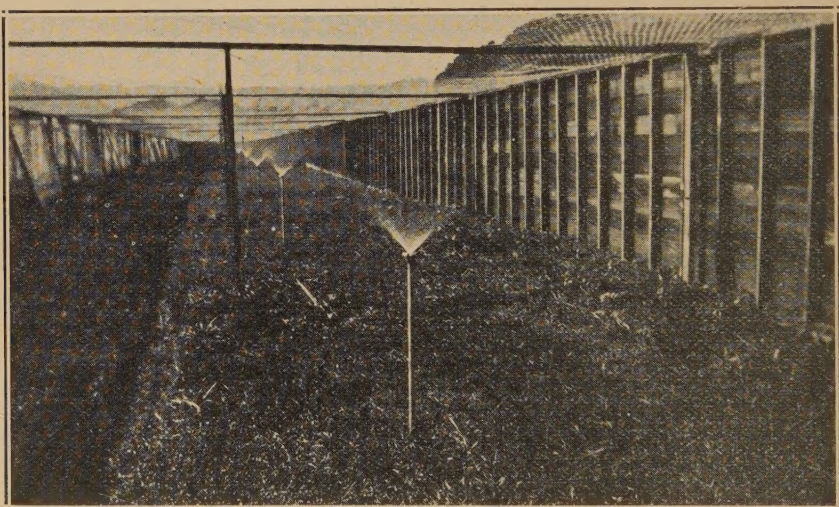


FIG. 16. A section of breeding pens with the partitions removed and the sprinkling system working. These pens have been prepared for breeding purposes and the partitions will be replaced again forming the twenty-four foot square pens.

who may have it in mind, possibly for the first time, to try their skill at the most fascinating game of them all—game bird farming.

If we are to leave any inheritance for the generations to come, and if they are to enjoy in a limited way the pleasure that has been ours in a very large sense, it behooves us to put our very best energies and resources into this most important work of artificial propagation.

Game farming is not a new idea. We have had game farms for many years. But in the past ten years, in keeping with other lines of industry, marked progress has been made. With the expansion of industries along the lines of quantity production, the small game farmer has seen his plant grow and the production increased almost beyond his fondest expectations. In these past few years, many states have willingly taken the output of the private breeders for stocking purposes. Many private clubs have also been in the market.

During the last twenty years, the state of Oregon has seen its department of game bird farming grow into a well organized scheme, consisting now of three farms, and all from the beginning of a private farm which the state purchased from Gene M. Simpson.

The state of Washington started with one small farm, operated in connection with the penitentiary at Walla Walla, and its first lot of eggs and birds came from the same farm from which Oregon started. Now Washington has two state farms and about fifteen county farms. The results have more than justified the effort, and the expansion has been far beyond the expectations of those who had to do with the original idea.

In establishing a game farm, either on a large or a small scale, there are certain vital conditions to be considered if you expect to be successful and get the returns on your investment of money and labor which you have a right to expect. Before a site is finally selected, carefully consider the following facts: character of soil during the entire year, drainage, and the water supply.

Most authorities will tell you to select a site with a southern slope. This is very well in a country where the seasons are marked by a wide range in variations of temperature. But if you are located in a warm section with little or no variations of climate, it is not so important. Sand or gravel soil must be had and the slope or grade of the ground should be about two feet in the hundred. Under no circumstances select a location on black or gumbo soil. Many failures are traced to this very reason.

Sandy soil usually drains well and lends itself well to cultivation and the growing of cover crops with a little water. It is also much easier to keep clean and sweet, a condition that is very desirable in bird raising.

In their wild state, game birds are as clean as it is possible for anything to be. They seldom stop twice in the same place for the night, but always have a clean room. When you confine them in a pen or run, these facts must be given consideration. That is why drainage and the kind of soil upon which your pens are built play such an important part in your scheme.

Then if you have carefully observed these birds, you will have noticed this fact: they will always insist on clean water. You usually find them near some cool spring or other source of water supply. You will do well to provide them with the same kind of water that you, yourself, enjoy. Public health authorities are continually telling us to be careful about the kind of water we drink. It is the source of many diseases of birds as well as humans.

If all of these facts are known and proper consideration is given them in the selection of a site for bird pens, many of the troubles you read about in game bird publications will mean very little to you. It is very much easier to prevent than it is to cure, and this old adage is doubly true and should be stated in far more drastic terms for the game bird farmer.

In getting the water to your pens a pipe line is superior to any other plan. The pipes should be laid in the ground, so the water will be cool, with risers in each pen. Three-quarter-inch pipe, with half-inch

risers, if there is very much pressure on the line, is sufficient for most purposes.

In a climate such as we have in California, a sprinkling system is well worth while, provided you have sufficient pressure on your water line to run the necessary number of sprinklers. If your pens are arranged according to the diagram that will be given later, one sprinkler head will do for two pens. This plan helps to cut down the expense of your water system and at the same time is found very efficient in practical experience.

In many sections of the country where the natural moisture in the form of rain is distributed over the entire season, an irrigation system is not so important. But in the dry areas where there is a lack of moisture over a period of several months, and the vegetation dries up, it is quite necessary to have a water system.

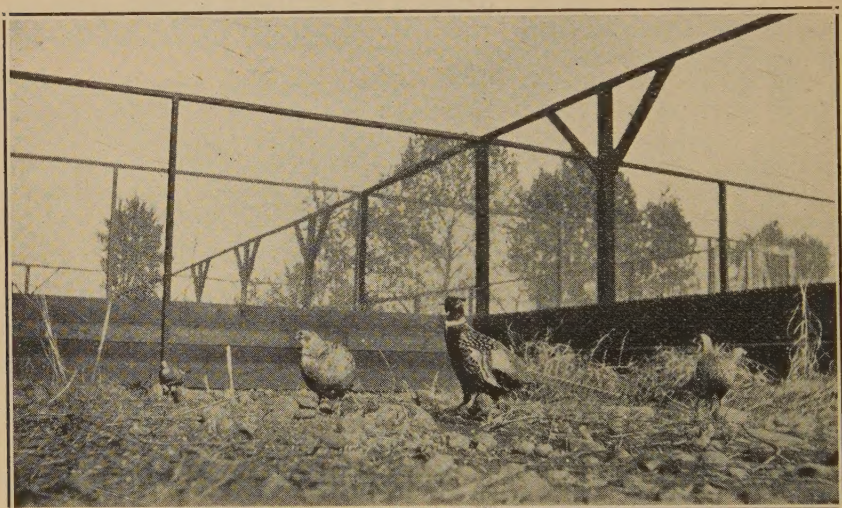


FIG. 17. A typical breeding pen of pheasants, one male to five hens. During the breeding season the male pheasant develops ear puffs that resemble horns.

The arid sections have many advantages in a climatic way that make them desirable as locations for bird farms, provided some sort of water system can be installed. A well and an electric pump have been known to give excellent results at a very low cost. Most farms have water supply under pressure so the task of hooking up a few bird pens is a small one.

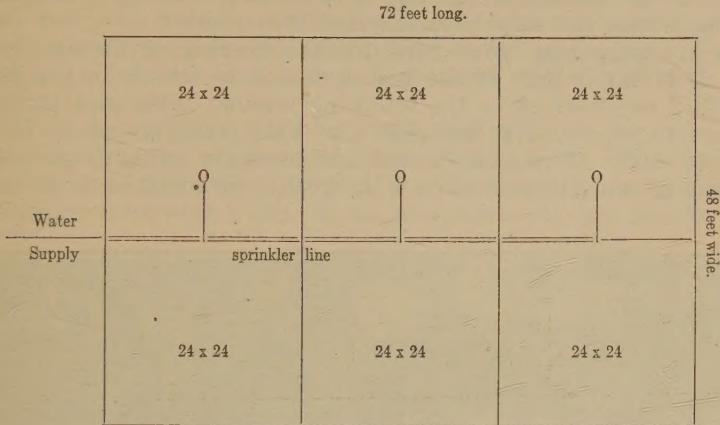
The sprinkler head that has been found to give the best results is one commonly used on lawns and is called the "Thompson." It has no revolving parts to wear out and throws the water with a fine spread. This flow of water can, of course, be regulated at the turn-on valve.

Both drinking and irrigation water can be supplied by one pipe line. Merely set your sprinklers on a level, and by opening the valve just a little the water will trickle enough for the birds to get a drink. By opening the valve wide the sprinklers will operate at full force.

Having the site and the water problem settled, the next thing is the size and kind of pens. In nine out of ten cases, the amateur makes his pens too small. This is a practice that leads to many troubles. Here

is the golden rule in bird raising. Allow each bird 64 square feet of pen room. A very convenient pen to build and one that will answer a number of uses is made 24 feet square.

Below is offered a sketch of six pens that most any one can build and in which the birds will be easily handled.



The easiest way to construct this enclosure is to first put up the frame work of 2 x 4, making the studs or posts 7 feet high. This gives you the height of the pens. Then run a baseboard 2 feet high around the entire structure, leaving a space of 3 feet for a gate in each pen. Use 1-inch mesh wire on the sidewalls and partitions and if you want to use the pens for quail, put 1-inch mesh on the top as well. If only pheasants are raised, 2-inch wire may be used on the top. Studs should be placed 8 feet apart. The removal partitions are made in two sections for convenience in handling. The partition along which the water line runs is made permanent. The risers for the sprinklers are 3 feet high. With this arrangement of removable partitions you may have a pen 24 x 24, or by removing one set of partitions you can increase the size of the pen to 24 x 48, or even make it 24 x 72. This type of construction also has the advantage of permitting the ground to be plowed with a team and cultivated as any other ground on the farm is handled.

Gates are 3 by 6 feet and made with 1 x 4 and 1 x 8. The bottom of the gate is boarded solid the same height as the baseboard of the pen. Six-inch light strap hinges are heavy enough to carry the gates. One-inch mesh wire is used on the gate and is the same width as the sidewalls.

Now that we have the pens, the next consideration is the kind of cover crop to grow. If you are using the pens for breeding stock, greens, such as kale and rape, should be growing in the pens. The best place for these is in the area covered by the sprinkler so they will have plenty of moisture. The other half of the pen which will be dry or semidry can be planted to buckwheat or oats. It is best to drill this seed in rows about ten inches apart.

In their wild state, birds go to shade and cover as they desire and when confined in a pen it is well to take this fact into consideration. If you can make them comfortable by giving them surroundings as

near to their natural state as it is possible to make them, you will experience very little trouble and your birds will be in a healthy condition at all times.

With this sprinkling system you will be able to create in your pens the exact conditions that birds like in their wild state. When they seek cover in the middle of the day it is usually in some moist, cool place. There they rest in perfect ease and contentment.

If you are preparing your pens for the rearing of young birds you will find that if part of the pen is seeded to alfalfa in the fall, it will afford excellent cover the following season. Also seed part of the ground to rape and a few plants of kale transplanted as additional green stuff. Clover also makes fine cover for young birds. An equalization of sunlight and shade is the goal to be aimed at in all bird pens.



FIG. 18. Methods of cultivating bird pens. The ground is worked just the same as any other part of a farm is cultivated. Removable partitions make this possible.

There are two ways in which you may get your start in birds. One is to get the adult birds for breeding stock and the other is to get eggs from which to hatch the birds. In either case be sure to patronize a reliable breeder so your foundation stock will be of the best.

Quail and Hungarian partridges breed in pairs but the ring-neck and Mongolian pheasants are polygamous and are best bred in the ratio of five hens to one male bird. Pheasant hens will average fifty eggs each for the season beginning about March 10th and ending July 1st. There is little to choose between the ring-neck and the Mongolian as game birds. The Mongolian is the larger of the two.

If you are starting with adult birds, you will want to know what to feed them. Egg production in wild birds, like domestic fowls, depends a lot on feed. Spratt's Pheasant Meal Number 5 is one of the important items. Precooked wheat flakes is another. Mix the two in equal

proportions and dust in a little egg maker of some good commercial brand. Give this combination of feed to your birds in the evening, and for morning feed let them have some good scratch feed that carries a good proportion of wheat with very little cracked corn in it. A good scratch food for pheasants is made with wheat or cracked wheat, oat groats, millet seed and just a little cracked corn. Adult birds are only fed twice a day. Gather the eggs as often as possible and under no circumstances leave the eggs laying around in the pen. You will in a short time know when to expect the most of the eggs to be laid and can be looking for them.

Whether you have your own breeding stock or buy the eggs, the hatching program is the same. Eggs should be set when they are not over three or four days old and have been kept in a cool place and turned at least once a day in the meantime. If you receive the eggs

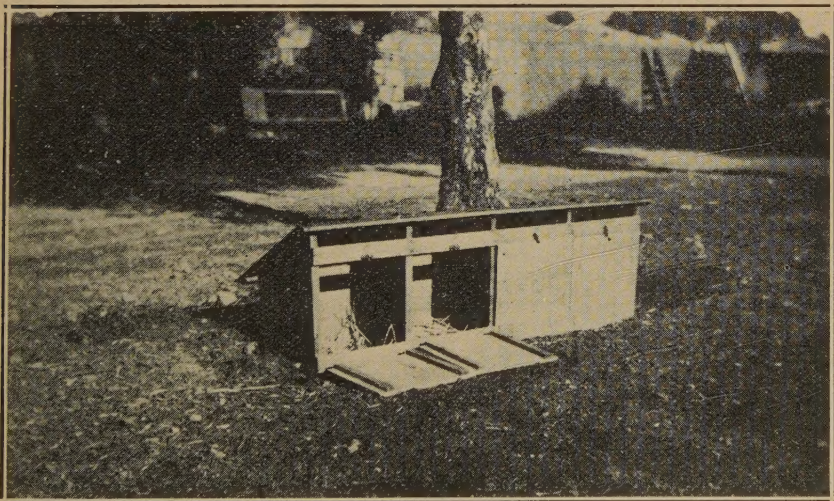


FIG. 19. A setting box containing four nests. Two are open and two are closed. While the hen is on the nest the doors are kept closed. She is let off the nest once a day for food and water.

from a distance of a thousand miles or more, let them set in a cool place twenty-four hours before putting them under the hen.

A small hen of either the Rhode Island or Buff Orpington breeds is the best. If possible, get a hen that weighs not more than three pounds. Bantams and their crosses with the buffs and reds make fine mothers.

In making the nest be sure and get it deep enough so the eggs will be below the general surface of the ground. This will insure better moisture and a better hatch. The above cut shows a good way to set pheasant eggs. This device will give absolute control of the hens.

Much of your success in rearing game birds of any kind, will depend on the care of the setting hen. First of all, she must be clean of any body lice. This can best be accomplished by the use of sodium fluoride as a dusting powder. Dust the hen before she is set and again on the seventh and fourteenth days. If she has "scaly leg" do not set her under any circumstances. The infection will be picked up by the young birds. Let her off the nest each morning at the same hour for

food and water. Twenty minutes is long enough. See that she goes back to her nest and then close the door.

Pheasant eggs will hatch in twenty-three days under a normal hen, but in calculating the time do not take into consideration the first day the hen is set. If you count this day it may require twenty-four days. Hens are usually set in the evening and the time should commence the next morning. If hatching is done on a large scale, the incubator may be used to good advantage. When the hens are set, start an incubator at the same time and they will hatch together. The incubated chicks can be given to the hens for brooding along with the ones they have hatched and become one family. But do not, under any circumstances, try to give a hen birds of different ages or birds of different varieties. They will almost invariably kill them.

In handling incubated chicks with the domestic hen, it is a very good plan to take the number of chicks you want to give to each hen and place them under her before you remove the hen and the chicks she has hatched from the nest. Leave them there for an hour or so before placing them in the field coop. I would not advise the use of the incubator unless you are hatching on a scale where you would be using at least several hundred hens during the season. Another use has been found for the incubator, by which many birds may be saved from being killed in the nest by the heavy hens that are sometimes used. Just as the eggs begin to pip, remove all but two or three from the hen and place them in the incubator, which has previously been tested for the proper degree of heat. Here is another point about the use of the incubator that must be watched to avoid bad results. The bulb of the thermometer should be on a level with the center of the eggs and not an inch or more above them. Here is a case where a very little distance makes a very great change in the degree of heat. It is the little things that sometimes cause the most trouble and trouble in the bird game means less birds.

After the birds are dry and begin to come out from under the hen, they are ready to be removed to the field coop. If it is a cool day, it is better to have a warm cloth or hot water bottle in the bottom of the basket, or bucket, in taking the birds from the nest to the field coop. Great care should be exercised to see that the little fellows are not chilled. At this particular time they are delicate and a chill may mean the end of them.

The field coop should be prepared in advance for the reception of the birds and the hen by covering the bottom with some clean, dry sand. Bank up the coop so that it will be warm and no draught of cold air allowed to pass under it. Also take another look for any small holes through which the little birds may make their escape. The first twenty-four or thirty-six hours is the most critical time in the life of the bird. He has come into this world under a peculiar condition. He does not understand the language of his foster mother, and she is not the right color nor the proper size, so taking all in all, he is bewildered and will run away if there is any possible chance.

With the birds snugly in the warm basket and the hen under your arm, proceed to the field coop. Place the birds in one corner of the coop and set the hen very close to them holding your hand against her breast so she will not, in her eagerness to care for them, step on the little fellows. With the other hand gently shove the birds under the hen

and, when she finally finds that she has her family again, she will settle down to the business of brooding them. In half an hour visit the coop and quietly peek in to see if all is well. If it is, go away and leave her to herself and the birds. This is the time she has been looking forward to and will do much better if left alone.

The brooding period usually requires twenty-four hours and can be tested by the action of the birds. When they are through brooding they will begin to look around for food and now is the time for the first feed. To your surprise you will probably find that in the short time they have been with the hen, they have accomplished a great deal. They have not only adopted the hen as their mother, but have learned her cluck and warning call as well. The family government has been established.

The following cut shows the kind of field coop and run that is much used by pheasant men.

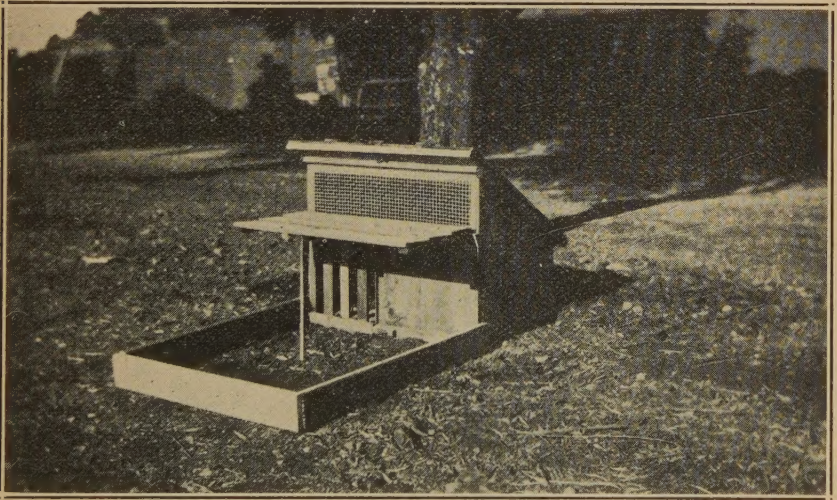


FIG. 20. The field coop in which the hen is confined for the first three weeks. The run in front of the coop is one foot high and holds the birds in close touch with the hen for the first few days. About the fourth day the little fellows jump over the run and then it is time to remove it. Notice the ventilating space in front of coop. Plenty of fresh air is desirable.

Having successfully hatched the eggs, the real work of the pheasant man begins. The little fellows must be fed. There are a number of different methods of feeding, and as feeding is very essential, it is well that we go into the subject quite thoroughly.

Generally speaking, there are two systems, known among pheasant men as the "wet" and "dry" methods. Both have merit and strong points but rather than try and pick out the best points of each and try and combine them into one, we will discuss the most generally used system and the one that has been used in this western country with success.

There is one thing that is well to remember in attempting to raise any wild bird or animal, and that is to find out what is its natural food. If you can duplicate that food, you will have little trouble.

The success and advancement of the game bird farming idea in the past few years has been greatly helped by the better understanding

of the kinds of foods that particular birds thrive and develop best upon. The birds we are mostly concerned with are the Chinese pheasants, Hungarian partridges, and the different kinds of quail.

We now know that these birds are insectivorous in every sense of the word. By that we mean their food in their natural habitat consists of bugs, worms and insects of many kinds, plus a reasonable amount of greens. These facts have been learned from a series of experiments carried on over a long period of time and the examination of the crops of many birds taken at various seasons of the year from widely

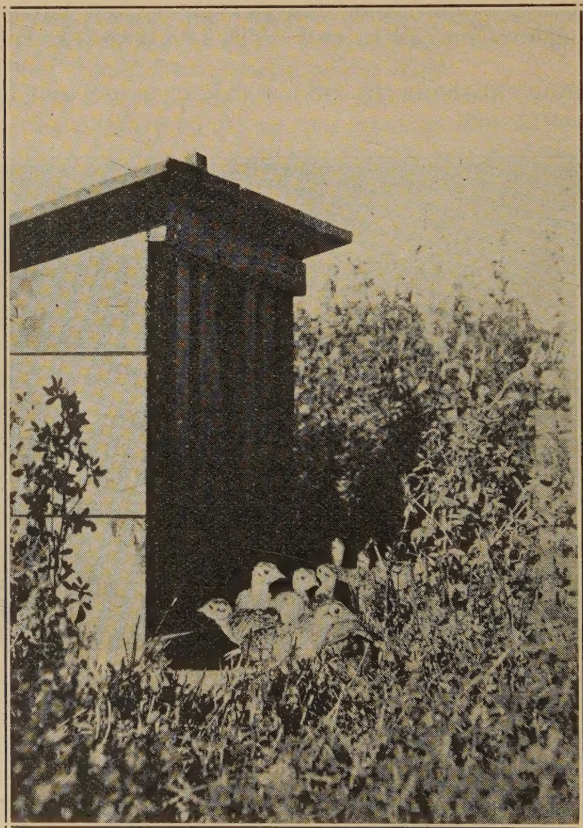


FIG. 21. A brood of young pheasants at feeding time. The run has been removed but the coop is their home. The front is slatted so the little birds can come and go as they please, but the foster mother remains inside the coop for two weeks. After that she may be let out in the pen with the birds.

separated sections of the country. Much of this work has been done by the U. S. Biological Survey and the different agricultural colleges.

To give a concrete example: a man complained that pheasants were eating his grain. A hen was shot in the middle of a thousand acre field where wheat was abundant. Its crop showed not one single kernel of grain. But on the other hand, the crop did tell the story of how the pheasant had been busy with cutworms, wireworms, grasshoppers and several kinds of wild seeds all of which are harmful.

Here is another fact that experience has taught pheasant men: game birds are about the cleanest things we know anything about. Seldom do they stop over night in the same place. They have a clean bed every night. What is the deduction? We can not be too clean either, in the matter of food or pens in handling game birds.

Before we bring forth any set kind of menu let us discuss fully a number of different foods and their relative values in the scheme of bird raising.

GREENS.

Any one who has observed closely the young bird during the first few days of his life will have noticed how he begins very early to pick at the green blades of grass and the clover leaves, if there are any. By an elimination process, lettuce has been found to be the one green food that most all birds like, and it is about the easiest of all greens to produce. Spinach, rape and kale are also good and rate about in the order named.

During the first twenty-four hours of the young bird's life, nature provides the nourishment from the yolk of the egg from which the bird was hatched. Thus it would seem that eggs could be used to advantage as a part of the ration. It is only going on with the work nature has begun.

BOILED EGGS OR CUSTARD.

Eggs may be used in two ways: either in the ordinary way of "hard-boiled" or made into egg custard. If you are good at making custard, I would advise its use because of the added value of the milk it contains. If you use the custard, do not season it in any way, and have it quite dry but not burned. It may be run through a fine sieve of fly screen after it has become well cooled and is ready for use.

If you use the boiled egg, see that they are well boiled and have ample time for cooling before feeding time. It is well to boil eggs the day before you want to use them. If dropped into cool water when they are first taken from the boiling water the shells will come off much easier. Then they should be run through the sieve the same as the custard.

MILK AS A BIRD FOOD.

Physicians and public health people have for a long time been urging us to use more milk as a part of our daily food ration. Here I want to recommend the same thing for birds. The form in which it is best adapted to bird life is what you have always known as cottage cheese. Make it in the ordinary way, with no seasoning or coloring matter in it, but have it just a little drier than for table use. Run it through the same sieve you used for the egg and custard.

The best ducks I ever raised grew up on a ration of old-fashioned bread and milk with some fine building sand sprinkled over it. Slice the bread about as you would for the table and place two slices in an ordinary pie tin. Pour the milk over it until it is well covered. (You known ducks like their food moist.) If you have a little of Spratt's Pheasant Meal Number 12 to add to the mixture, it will not be objectionable to the ducks.

Now we said that pheasants, Hungarians, and quail were insect-eating birds. How shall we provide this part of the menu? In years past, and with some of the older men of today, "bugs" are still manufactured for this very purpose. The blue fly was put to work,

and what is commonly known as "maggots" were produced. In many ways this work is objectionable and is quite expensive when large numbers are required. If the bugs are not thoroughly cleaned before being fed to the birds, bad results may be the reward.

But some one discovered that fresh liver, either beef or hog, was a fine substitute for the manufactured bug. It at least has this advantage, that it is usually government inspected and is clean. Here is about the most satisfactory way in which to use it.

BOILED LIVER.

From a packing house or your butcher procure some fresh liver. With a sharp knife, cut it into strips of about the same size so it will cook evenly, and boil it in the same way as you would any piece of meat until it is well done. Let it cool and then run it through an ordinary food chopper, making the pieces very small. If you can not get them small enough with the chopper resort to the sieve you used with the eggs. When the birds are not more than a week old the bits must be quite small or they will not be able to swallow them.

SPRATT'S PHEASANT MEAL.

Spratt's Patent Limited for more than fifty years has made foods for all kinds of animals and birds, and their product is quite essential to any well-regulated bird farm. Their pheasant meal is made in three sizes for convenience in feeding birds at different stages in their development. The smaller size, or number 12, is for young birds; the next size or number 5, for half grown; and then there is the number 3 for adult birds. This food may be purchased at their San Francisco store at 1186 Howard street, in any quantity you may want. The directions for preparing this meal will be given on a later page. It is mentioned here because of its worth as it fits into the scheme of a well balanced ration.

In bird farming the well balanced ration is being given just as much consideration as the household economist is taking in the matter of a well regulated menu for the table. Too much of any one food is to be avoided and more particularly those foods that are the richest and at first may appear to be the most nourishing. A well balanced ration for birds consists of foods that will produce muscle, bone, flesh and feathers in an even and methodical manner.

No doubt you have seen young, domestic fowls of the common varieties, that were quite large in their body development, but had no feathers. I have seen game birds in the same condition. It was a plain case of a ration that was not as it should be. It was not balanced. In this very highly developed stage of the poultry business, one finds all kinds of foods guaranteed to produce the results desired. And there is no question but many of them have merit if fed in the way the manufacturer has stipulated.

VALUE OF COOKED FOODS.

Possibly you have already noticed that all of the foods so far mentioned, with the exception of the greens, are cooked. My experience has led me to believe that game birds or all insectivorous birds should be fed on cooked foods until they are close to maturity. Some will take exception to this but I am merely giving it to you as my experience. The digestive processes of these birds are not as strong as domestic fowls and anything you can do towards making the food a

little more digestible, will give the bird that much more energy to be used in putting on flesh, building muscles, and growing feathers. After the birds are eight or nine weeks old and at the age when many authorities will tell you to begin the use of scratch feed, I have always made it a practice to scald their feed so the fibre of the grains will be broken to some extent at least. Many people are using the uncooked feeds because it is much easier. There is no royal road to success in the bird game, but just a lot of real work. If the business is worth doing at all, it should be done well, and no pains spared in getting at the real bottom of things.

This calls to my mind an experience that happened a few years ago. The department sent me a man nearly sixty years old who was to work through the bird season, in order to gain enough experience so he could handle one of the many county farms in that state. The man had been a fishculturist most of his life. He was given about one hundred birds to feed as a starter. After a week or so he said they ought to have scratch feed and he began giving it to them. He was there for experience so I thought it best to let him get it. At the end of two weeks he had only thirteen of the birds left. That ended the uncooked food program so far as he was concerned.

PRECOOKED WHEAT FLAKES.

These wheat flakes are the same that you have been accustomed to use as a breakfast food, and may be had from any manufacturer of breakfast cereals. In feeding matured birds, the wheat flakes are usually mixed with the Spratt's Pheasant Meal; but a better way to give them to young birds is to place a dish of the flakes, in the dry state, near the coop so the birds may eat as they feel like it. At first it is a good idea to rub the flakes in the hand so the particles will be well broken up into such small particles that the birds will have no difficulty eating them. A dish of these wheat flakes can be kept constantly before the birds until they are full grown. It is a good food and can be recommended. The dish should be sheltered so that in case of rain they will be kept dry. As the birds near maturity, you may be surprised at the amount of this food they will consume.

Now that we have discussed the different foods that have proven valuable in the raising of birds, the next thing is to get the combinations that will give the bird a complete and well-balanced ration.

In this matter you will be guided to some extent by the local conditions and the experience you have had with birds. It is very hard to make a hard and fast rule that will be exactly right all the time. But we can outline the schedule and give data that will apply in the majority of cases. In this business you will be required to use your best judgment many times and employ about all the ingenuity you possess.

After the young birds have quit brooding and begin to explore the coop, it is time for the first feed. This will consist of finely grated, hard-boiled egg, or egg custard grated, and finely chopped lettuce. About one teaspoonful will be sufficient for a brood of a dozen birds. Give the hen some whole corn and a drink of water, but keep the water away from the little birds for the first two or three days. After that they may be given a drink in a shallow pan, but do not leave the pan near the coop so that they will be walking in it. This watering dish

must be kept clean at all times. A thorough scalding one or two times a week will help in keeping it clean.

If you will use a smooth board about one foot square for a feeding place, you will find it has several advantages. Place it just far enough in front of the coop so that the hen can not reach all the feed, only a portion of it, and she will quickly teach the little fellows how to eat this domestic food. But if you get the board too close, the food may disappear and lead you to believe the little birds ate it all.

This board will not only help you to keep the food clean, but it will help you to check up on the amount the birds eat. If the birds are eating as they should, all the food should be off the board in thirty minutes after it is placed there. It is not advisable to leave any uneaten food around the coop to sour and cause trouble.

Young birds must be fed four times a day for the first two weeks at least. Not too much at a time, but oftener, is the safest rule. If you start at 6 o'clock in the morning, and that is a very good hour, make the next feeding time at 10, then at 2 and then 5:30 in the afternoon. Here is a most valuable hint: when you have decided on the feeding hours, don't change them. Always be on time for the birds will be expecting you at that time. If you disappoint them, and persist in irregular hours, you will be the next to be disappointed.

About the second day begin to mix in some of the Pheasant Meal Number 12 in all four feeds. Make the pheasant meal half and half with the egg. At this time you may add some of the cooked liver to one of the day's feed, and it does not matter much which one it is, but make it only about 10 per cent. This is also a good time to begin the use of cottage cheese.

The ration now consists of the following ingredients: greens, pheasant meal, cooked liver, boiled egg or custard, and cottage cheese. A careful survey of these foods will convince the most skeptical of their nourishing qualities. They contain the essentials for full and rapid development of bird life.

The following scale of proportions will give a fair idea of the amount of each ingredient to be used in mixing the feed; egg or custard, 15 per cent; pheasant meal, 25 per cent; cooked liver, 10 per cent; cheese, 30 per cent; and lettuce, 20 per cent.

Spratt's Pheasant Meal is prepared by being softened with hot water, hot broth, or milk. As a general statement, it will take a quart of liquid for each quart of meal. Do not pour the liquid over the meal at one time, but stir and pour at the same time so each particle of the meal has a chance to receive its portion of moisture. You will at once notice the expansion that takes place in the particles of meal. After a little practice you will have no difficulty in getting just the right proportion, so it will be easy to get the meal ready. After it has been moistened, let it stand at least two hours before using and in the meantime give it an occasional stir. The meal that you intend for use in the morning feed can be softened the night before. There is danger of this meal becoming sour if it is moistened too far ahead of the feeding hour, unless it is kept in a very cool place. But you can nearly always detect any sour feed by the odor. Of course, it should not be used if sour.

If you try to mix all these different items together there is danger of getting your feed too damp, so it is better to have the lettuce in a separate pail as it contains a great deal of moisture. The other items

are all about the same in moisture content so in mixing there should be no tendency toward increased moisture. If you do happen to get your feed too moist you may sprinkle it with corn meal and work it over until it is just right. Here is a good way to test your feed. Take a handful and squeeze it. No moisture should be in evidence and the lump should crumble readily. This is what is meant by "crumbly moist." Try it out.

You now have the daily menu. This should hold good for about two weeks when a change should start in a very gradual manner. Decrease the amount of egg or custard and increase the amount of meal. At the end of four weeks the egg or custard should no longer be in the feed. In the same way, when the birds are about six weeks old, cut out the 2 o'clock feed, and a month later eliminate the 10 o'clock meal. The birds will now be eating at the natural time for game birds, morning and evening. Here is another hint that you may find valuable in your work. Even quite young birds respond to their natural instincts, in that they will usually, at an early age, show signs of wanting more feed at the early morning and late afternoon feeds. Watch for this peculiarity. In fact, watch your birds more than you do the clock, and you will find out many very interesting facts.

When the birds are about eight weeks old, it is a good time to introduce the scalded chick or pullet scratch. This food may be prepared by placing the amount you want to use in a bag and letting it stand in boiling water for about twenty minutes. Remove it and hang up to drain and dry out. It will quite well take the place of a part of the pheasant meal and thus reduce the cost of the food.

As the birds mature they will consume more greens, if it is possible for them to get them, and you will find that you may further reduce the cost of feed by providing more greens and you will at the same time be insuring your birds against some of the troubles that come to those who forget this very important element of food.

Provide plenty of greens, cover, good water, and clean roomy pens, and you will surely be rewarded by a fine lot of strong, healthy birds, and really get the return on your investment that you are entitled to expect. Eternal vigilance is the price of good birds.

HOW TO HOLD AND DUST A HEN.

As it is most essential to have your brood stock clean and wholesome, it is well to know just how to do this work easily. In conversation with a farmer from whom I had been buying a number of setting hens, the question of dusting came up. I asked him how he did it and he said: "I hold the hen while my wife applies the powder, and it is the worst kind of a task." We were standing near the chicken house, so I said: "Let me show you how it is done at the game farm." This is the procedure.

Place your left hand along the back of the neck of the hen, grasping the left wing close to the body with your thumb, and with the little finger and the next one to it, get hold of the right wing of the hen. Gradually pull the two wings close together and lift the hen off the nest. As you hold her in the air or close to your body, quickly turn your wrist over to the left and you will find the feet of the hen sticking up in the air, and you are now ready to go to work with the right hand.

In using this system you will always be able to get the powder where it belongs, and that is on the skin of the hen, and not on the outside of the feathers. Take a pinch of the sodium fluoride between your thumb and first finger and place it against the skin before you release it. Then after you have released it, ruffle the feathers with your hand.

Lice are most often found around the base of the tail, under the wings, back of the neck, and on the underneath side of the body, so these are the places to put the powder, remembering that the powder must reach the skin to be effective. Dust the hen when she is set, and on the seventh and fourteenth days of the incubating period. Do not dust the hen within five days of the hatching time.

WE MUST PRODUCE IF WE WOULD DESTROY.

By 'GENE M. SIMPSON, Superintendent Oregon State Game Farms.

The early settlers of this country found game so plentiful that it seemed impossible for it ever to disappear. In the prairie states of the middle west the prairie chicken will soon be but a memory, but the pheasant is taking its place. Propagation in captivity has made this possible, in fact propagation is the only solution of the future game supply. Propagation in captivity saved the buffalo from extinction, and would have saved the passenger pigeon, had it been possible to secure a mate before it was too late for the last remaining specimen, a female, which died in the Cincinnati Zoo about sixteen years ago. Once the most abundant species ever known in any country, selling in the market in Boston in 1736 for twopence per dozen, the passenger pigeon was exterminated, but exactly how no one knows.

Many states have one or more state game farms, others buy game birds from private game breeders for releasing each year. Better success has been had in propagating pheasants than with any other game bird. Up to the present time no one has successfully reared in captivity any of the true grouse species. For the present, at least, we should confine our efforts to the pheasant, wild turkey, native quail and Hungarian partridge. Regardless of the fact that European authorities claim they can not be raised in captivity, American game breeders will raise the European gray, or Hungarian partridge, and raise them successfully. The proper mating of the breeding stock and their care during the laying season seems to be the all important factor in their management. Oregon has had an open season on Hungarians in one county, and a bill is now before the legislature opening two additional counties.

HUNGARIAN PARTRIDGES.

Thirty-seven pairs of Hungarian partridges were liberated in Garfield County, Washington, in the spring of 1914. From this planting the birds have spread into all adjoining counties, and into Wallowa County, Oregon, and over half a dozen counties in Idaho. Mr. C. A. McCabe, chairman Garfield County game commission, in a paper read at the Washington State Association of County Game Commissioners and Game Wardens annual convention in Seattle in January, said:

"Last fall (1926) we had an open season of six weeks, commencing September 16th, with a daily bag limit of eight, and no season limit.



FIG. 22. Feed room and breeding pens at the Pendleton Game Farm, Pendleton, Oregon.



FIG. 23. Virginia wild turkeys are being reared on the Oregon State Game Farm at Pendleton, Oregon,

I believe an estimate of a bag of ten thousand in Garfield County this year is conservative, and I do not believe the kill ten per cent. I believe the birds left today in this county at present market prices represent an actual asset of between one-half and one million dollars. And all this comes from an initial outlay thirteen years ago of \$375.00, with our neighbors as bountifully supplied as we are.

"Although from Europe, the partridge does not believe in marriage by arrangement or of convenience, but follows the American custom of personal selection of mates, and therein lies the difficulty in rearing them in confinement.

"Their introduction has been the greatest outstanding accomplishment in aid of the sportsmen in the history of our state."

The Hungarian partridge possesses the alertness and cunning so necessary to outwit their many enemies, man included. From the fact that they completely cover their nests with grass, leaves and dirt, their eggs are found with difficulty. This trait alone protects their eggs from the depredations of crows, magpies, bluejays, and no doubt also from skunks and small predatory animals.

It is claimed by some people who ought to know better that the imported game birds in this country have driven off and killed the native game birds. We would be having mighty poor upland game bird shooting in the Pacific Northwest today had it not been for the importation of the Chinese pheasant and the Hungarian partridge. Even had the Chinese pheasant never been introduced our native grouse and quail would have been just as scarce as they are today. In fact, they would have been more scarce, because the hunter would have confined his attention to them and their extermination, for they can not withstand the trained dog and pump and automatic gun, as the Chinese pheasant can. The fact that the pheasant produces two, and sometimes three, broods a year is the strongest argument for their desirability as a permanent game bird over the native birds with their one brood. An unfavorable season may materially reduce the broods of the native birds, but the pheasant has two or three chances in the season.

Closed seasons and reduced bag limits will not bring the game back. We must produce if we would destroy. Mr. E. A. Quarles, formerly secretary of the American Game Protective Association, and founder of the American Gamekeepers' Society, in addressing the National Game Conference of the American Game Protective Association, held in New York City, December 6 and 7, 1926, said: "Why is it possible for thousands of sportsmen without means to belong to private clubs to share the joys of their more fortunate brethren in sport with upland game? Ask the gunners of Oregon, of New Jersey, of New York and the answer will be respectively, 'Gene Simpson, Duncan Dunn, Harry Rogers.' The public game covers of these states teem with ring-necks, due to the genius of these three veterans, history makers in the development of our present day sport with the gun."

The early history of the first importation of Chinese pheasants into Oregon is well known. Less than 50 birds were brought from China in 1880, by Judge Owen Denny, then United States Consul General at Shanghai, and liberated in Linn County, Oregon. Mrs. Denny, Judge Denny's widow, now in her 90th year, resides in Portland, Oregon,



FIG. 24. Pure Virginia wild turkeys, Oregon State Game Farm, Pendleton, Oregon.

and draws a pension of \$50.00 per month from the State Game Fund, and will continue to do so as long as she lives. But it is not generally known how California missed being stocked with pheasants. Before returning to the United States Mr. Denny made arrangements with a Mr. Redding, of San Francisco, to receive and liberate a shipment of game birds. A shipment of nearly 90 birds arrived at the wharf, San Francisco, as the funeral procession of Mr. Redding was taking place. He had died suddenly and no arrangements had been made to receive the birds. The birds had to be taken from the boat, and, no one seeming to know anything about them, the sailors finally bartered them off along the waterfront.

WILD TURKEYS.

Wild turkeys, our rapidly vanishing national game bird, can be raised in captivity even easier than our domestic varieties, and we should lose no time in doing so. The wild turkey, the largest game bird in the world, so numerous throughout the eastern and southern portion of the United States in earlier days, is now greatly reduced in numbers and found only in a few favored localities. Even now it is difficult to find the pure wild stock, for the reason that they have so intermingled with the domestic flocks in the vicinity of their range.

Not all localities are suitable for stocking with wild turkeys. Oregon is successfully stocking the counties bordering on the California line, and no doubt California could do likewise in the northern portion of the state.

The Honduras or ocellated wild turkey of Central America, is the smallest, most brilliantly colored and the least known of all the varieties of wild turkeys. While this bird has never been domesticated it undoubtedly could be raised in semidomestication and might prove a worth-while game bird for southern California.

Early explorers of North America found the wild turkey a welcome source of food supply. So plentiful were they that in 1711 they were sold in Connecticut at one shilling fourpence each. Alert and cautious in the wild state this grand American game bird, when raised in captivity, refuses at first to revert to its primitive state when liberated. Broods hatched in the wild state, however, assume all the wild characteristics of their progenitors, providing they were liberated far enough away from the haunts of domestic turkeys, with which they are wont to fraternize.

DOLLAR-A-YEAR WARDENS.

By WALTER R. WELCH, Field Assistant.

About a year ago an appeal was made to the Fish and Game Commission through the Associated Sportsmen's Clubs of California to appoint men who might volunteer their services as deputy fish and game commissioners to assist the regular patrol in the protection of fish and game and in the enforcement of the fish and game laws.

Although the Fish and Game Commission had at one time appointed a number of men from the various sections of the state to act as volunteer game wardens only to find a great majority of them a liability

rather than an asset, and although several other states had met with the same experience in the appointment of men to act as volunteer game wardens, the commission decided to consider the appeal of the sportsmen.

Upon investigation it was found that in order that those appointed as volunteer game wardens be empowered with authority to make arrests for violations of the fish and game laws, it would be necessary that they be regular salaried deputies of the commission. Therefore, the commission decided to pay the volunteer game wardens a salary of one dollar a year. Thus the term "dollar-a-year game warden" originated.

After the lapse of several months, and the appointment of a number of men to act as dollar-a-year game wardens, all of whom had been sponsored for the position by various associations and clubs within the state, the commission found that these men were not accomplishing what their enthusiasm had led them to believe they could, and that something must be done to have the dollar-a-year wardens become more active and efficient and to have them coordinate with the regular patrol in the enforcement of the fish and game laws and in the protection of fish and game, or it would be necessary for the commission to abolish the policy of appointing dollar-a-year game wardens.

Prior to making that move the commission decided to endeavor to organize the dollar-a-year game wardens throughout the state into an active, efficient, harmonious, cooperative body to coordinate with the regular patrol for the protection of fish and game and the enforcement of the fish and game laws.

This is the first move of the kind that has ever been undertaken in this or in any other state, and it is believed it will result very beneficially to the protection of fish and game and in the enforcement of the fish and game laws.

As it is the desire of the Fish and Game Commission that the enforcement of the fish and game laws be clean and just in all ways, the record of the successful game warden does not depend so much upon the number of arrests he may make as it does upon his ability to educate the people of the state as to the value and necessity of the fish and game laws, and to suppress violations.

All dollar-a-year game wardens work under the direction of the regular patrols, through a captain in the county in which they reside.

All dollar-a-year wardens work under a regular system and their activities in the field are confined to the counties in which they reside, except in cases where a violation of the fish and game laws is committed in their presence, or when they have been detailed to perform special duties outside their respective counties.

The work of all dollar-a-year game wardens is directed and controlled under a system similar to that governing the regular patrol, and they are vested with the same authority as that of the regular wardens for the enforcement of the fish and game laws in all sections of the state.

Attention is called to the fact that while the dollar-a-year wardens perform duties similar to and assume all the responsibilities of the regular patrol, they receive no compensation for their services other than that of one dollar a year.

The efforts made by the dollar-a-year game wardens for the protection of fish and game and in the enforcement of the laws are prompted solely by their interest in wild life conservation for the benefit of the people in general, and by their desire to aid the Fish and Game Commission in its work to that end.

Thus far the counties of San Joaquin, San Francisco, Alameda, San Benito, Santa Cruz, Santa Clara, San Mateo, Monterey, Contra Costa, Humboldt, and Los Angeles have been organized, and the dollar-a-year game wardens in these counties, in coordination with the regular patrol and with the cooperation of the sportsmen, have accomplished splendid work in the enforcement of the fish and game laws, and in the protection of wild life in general.

Men, who from pure love for fish, game and wild life, will volunteer their services for its protection and conservation, and who will assume all the responsibilities, risks, and hardships surrounding game wardens in the performance of their duties in the fields and on the streams surely merit, and should receive, the confidence and respect of every sportsman and the full support of all of the people.

BELIEVE IT OR NOT.

By AUGUST BADE.

THE MOTHER INSTINCT.

It was the custom at the Walla Walla farm to hatch about one hundred mallard ducks each year. A lake that covered about an acre of ground afforded the grownup ducks a most excellent place to live. This lake was bordered by an alfalfa field that gave the hens a fine place in which to nest. But a great many eggs, especially at the beginning of the laying season, were dropped around the edge of the water. These eggs were picked up each day and finally set under an old domestic hen. It was from these eggs that we hatched many broods of ducklings.

When the little ducklings were about two weeks old they and their foster mother were placed in a small enclosure about one hundred feet square that had a walled-up pool in the center. Here is where the hen began to realize what trouble was as she lost complete control of the brood so far as the pool of water was concerned. But in a short time, when she found that the water did not in any way hurt them, she became reconciled and they took their daily or rather hourly dip as a matter of the day's work.

It so happened one year that we had hatched four goslings of a large domestic variety. When these were about three weeks old they were also placed in the enclosure with the ducklings. It was not long until I noticed one of the goslings had a brood of young ducklings with her and was apparently playing the part of mother to them. A little further investigation proved this was correct. She had actually robbed the old Buff Orpington of her entire family. There was very little difference in the ages of the goslings and the ducklings but of course there was a vast difference in their respective sizes.

NATURE HER OWN PHYSICIAN.

About a week after the hunting season had closed a farmer called me one Sunday afternoon saying, "My hunting dog has brought in a crippled cock pheasant." It was the custom to go out and get all birds or eggs that were reported by the farmers to save them from destruction. It was found that this bird had a very badly broken right wing, evidently from a gun-shot wound at least a week before. The large bone was completely shattered and only the muscles and skin were holding it to the bird's body. It looked like a very hopeless case, but I thanked the man for his interest in the matter and took the bird back to the farm.

My first thought on reaching the farm was to cut the bird's head off and end its suffering. But remembering other cases in which birds had recovered, but none of them as bad as this one, I concluded to try and learn more about nature's way of handling bad cases.

I placed the bird in a pen that had in one end a great deal of cover. This pen was known on the farm as the "hospital pen." The bird crawled into the covering with the broken wing dragging at its side. For about two weeks I never saw the bird and had concluded that he was dead. But one day I saw his head as he peeked out from the covering. In about another week I caught a glimpse of him and could see that the wing did not hang so low. I felt encouraged and it was not many weeks before he could be seen around the pen with the other birds and while the wing hung a little low it was not dragging the ground as it was on the Sunday afternoon when he first came to the farm.

The following spring he was liberated with some other birds and could fly just like the rest of them. The wing had resumed its proper position at the side of the body, and with the exception of a small enlarged place at the break, was just as good as ever.

GAME PROPAGATION.*

By AUGUST BADE, Superintendent California State Game Farm.

It has become apparent to the close observer that our game birds and many game animals are decreasing at an alarming pace. So quietly and systematically has this depletion taken place that in many cases the birds have almost become extinct before sportsmen realized the real conditions. We will not endeavor here to set forth the reasons for all this shortage in our wild game, but suffice it to say that better roads, the automobile, and the general settling up of the more remote districts have had their share in this orgy of depletion.

As my work is particularly with game bird propagation I will touch upon that phase of the question only. In the limited time allotted it will only be possible to scratch the surface in the hope that some idea or thought of helpfulness will be dropped.

As the first year of the new farm at Yountville is now a matter of history, I wish to take this opportunity to thank the men in the field who have so whole heartedly cooperated in the work of distribution,

* Address given at Second Annual Convention California Fish and Game Commission Employees, San Francisco, February 8, 1927.

and made it possible to take care of a large number of birds successfully. From the Imperial Valley in the south to Mount Shasta in the north we have had nothing but the heartiest of coordinated effort from deputies and sportsmen's organizations. There has been an entire absence of that spirit of "let George do it," and while the work was new to many, it must be said in all fairness that it was done well.

To the question most often asked, "What are you going to raise in the largest numbers at the farm?" my answer has always been the same, "The ring-neck and Mongolian pheasants." We will devote a great deal of time to other birds, such as the valley quail, Hungarian partridge, and other native species, but you will readily understand and agree with me, when you know this king of all game birds, the ring-neck pheasant, more intimately, why he has been selected as the object of the chief concern of the work at the farm.

This bird more than any other, because of certain traits of character, lends himself to domestic propagation readily. His ability to care for himself under adverse conditions, either climatic or from a food supply standpoint, is now taken as a matter of fact by those who know him best. As is sometimes the case, if he should fall down on the job assigned to him, much investigation and comment is at once indulged in. He has made good in so many cases that we have come to look upon him as invincible. He has been transplanted from his native country into nearly all the temperate regions of the world, even including many islands of the sea.

How well he stands the rigor of northern climates is testified to by many sportsmen, as well as the writer, who has seen thousands of them in snow varying from a few inches to two or more feet in depth with the thermometer from eighteen to twenty degrees below zero. To sum it all up in a single sentence I would say that he is the most versatile game bird to be found anywhere.

Then there is another angle to this fellow that few people know about and one that is seldom stressed by writers and speakers—his relationship to the welfare of mankind. These birds do little or no harm to crops of any kind, although they are wrongly accused in many instances. In nearly all cases, when the facts are laid on the table and the evidence is weighed, the bird is pronounced "not guilty."

You may observe them making regular trips into the grain fields morning and evening, not for the purpose of destroying the grain but because insect life is more plentiful there than elsewhere. This bird is purely insectivorous and considers wireworms, cutworms, beetles, and bugs of every kind a very delicious dish. What better ally can the farmer have than this tireless destroyer of his arch enemies?

Many farmers who have come to know the economic value of the bird have posted their lands against hunting and would not even kill one for themselves. One farmer upon whose lands the birds had been planted by the writer, came back and asked for more, explaining that he had cut an extra crop of alfalfa hay because of the presence of the birds which had cleaned his field of wireworms.

Another case that was brought forcibly to the attention of the writer concerns a location near Twin Falls, Idaho. In 1916 a number of the farmers in that section brought in a number of pheasants and planted them on their ranches in order to have a little private shooting of their

own. They had agreed to protect them over a period of five years and that agreement was carried out. In 1922 that section of Idaho was visited by a terrible scourge of grasshoppers. All vegetation of a green nature was completely wiped out. Many farmers lost heavily in destroyed crops. But it was not so with the men who had the birds on their places. They suffered no loss and were sports enough to give credit to the birds. Many more incidents could be cited but we will give just one.

William Beebe, who possibly knows the pheasant as well as any living man, having studied them in their native haunts and written the most authoritative treatise upon them that has ever been published, has this to say: "One can best realize this when he sees the hundreds and thousands of ring-neck pheasants living in and about the grain fields of China, doing no damage, but probably doing much to keep down insect pests. Now that the Chinese are, with other occidental innovations, taking to a meat diet, the pheasants are immune in none of their natural haunts save where the Buddhists and Hindus hold sway. Everywhere, they are trapped, snared, shot with real guns, or killed with poisoned arrows. In all British colonies they are protected by well regulated game laws, and the hen and her brood of young birds are immune."

Taken as a whole, pheasants are more adapted to domestic breeding than any other group of birds. Long after the last native game bird has disappeared you will still find the pheasant being bred in a domestic way. They will not only be found supplying sport but food for a large number of people.

Just a few words now regarding the best way of propagating these game birds for the benefit of the sportsmen in general. He is the fellow who is "paying the freight" and is entitled to a legitimate return on the money he has invested through a hunting license.

In the old countries pheasants are to be found mostly on the large estates and only afford sport to limited numbers. Of course the land owner pays the bill and has the right to say who will enjoy the sport of the open season. We have improved a little on that method and have conceived the idea of creating certain closed areas where the birds are planted and allowed to multiply and stock the adjoining territory. This plan has been used by a number of states with success. Pennsylvania is one of the outstanding examples. No one can say they are not pleased with the scheme.

I have always been an advocate of the closed area, or bird sanctuary as some are pleased to call it, and at the same time believe the idea should be carried still further, so that new blood in the form of added stock each year from a state game farm or other source of supply, can be added in order to build up the vigor of the stock and at the same time increase the size of the individual birds. Experience in liberating domestically reared birds into closed areas has proven the wisdom of this scheme.

In order to have these closed areas and carry the scheme to a successful conclusion it is necessary to place responsibility on certain shoulders. Not only should the area be well marked with signs of warning, but a reasonable amount of vermin control is necessary and all poaching reduced to the limit. This sanctuary must become the

quiet congenial home of the birds, where they can not only be safe from physical harm but rest in comfort and quietness.

No locality or section of the country will ever get the best results from bird propagation until there is more general understanding of the value of bird life and a fuller realization of the costs in time and money expended.

Well established sanctuaries, more game farms for actual production and distribution, a little careful supervision in vermin control will go a long way to bring back the conditions that the "old timers" like to tell us about.

SECOND ANNUAL CONVENTION EMPLOYEES OF THE CALIFORNIA FISH AND GAME COMMISSION.

By RODNEY S. ELLSWORTH.

For the three days of February 8, 9 and 10, the employees of the Fish and Game Commission convened the second time in San Francisco. There were over a hundred in attendance at the convention and every department was represented of those who share in the conservation and protection of the wild life of California.

The big feature which the convention made possible was the opportunity afforded to so many men from so many sections of the state engaged in so wide a range of activities to assemble and obtain a broader view of the work of the Commission. Seldom do these men have an opportunity, even through the medium of correspondence, to exchange ideas and experiences. The convention filled a long felt need in this respect and all realized the benefits derived from personal contact. The older members were impressed by the caliber of the new men while the younger members, in turn, were proud of the fact that they were associated with such a splendid body which through the years has gained the respect and confidence of the people of California. Everyone left the convention more enlightened and better fitted to go out in the field and carry on.

It is interesting to hark back to the first convention of the Commission which so impressed everyone and resulted in a demand that meetings of the same kind be held every year. The commonest belief was that the first convention was an experiment. However, this idea has been banished, for the success of the second convention assures that the experimental stage is over and that assemblies of those devoted to the preservation and increase of the state's game will be a permanent fixture in the Commission's activities.

One of the objects in the reorganization was to make the commission function as a business. Consequently, it was gratifying to observe throughout the convention how nearly the Commission assumed the character of a big business concern and how closely its workings resembled those of any modern corporation.

The convention was a real success. There is no doubt about it. The program was educational and instructive to a high degree. Many problems were presented and discussed and some excellent papers covering a wide range of subjects were given. Each speaker had information

of value. Some had worked out problems of the greatest interest and of importance of the future.

The following resolution was passed before the conference closed:

“Resolved, That we, the employees of the California Fish and Game Commission in annual convention assembled, do here wish to express to the commissioners and their executive officer our sincere appreciation of the opportunity afforded the employees of this Commission to meet together and discuss our mutual problems and to know each other better, and to express our hope that these conventions may be continued from year to year in the interest of mutual betterment, and of better service to the state.”

The opening address of the convention was delivered by President Zellerbach who stated that the Commission since its reorganization has been trying to make itself attractive to the people of California and to the sportsmen from a business standpoint and to convince them that every dollar spent for licenses by them meant a consequent increase in the Commission's program of conservation. “Let the people know this is their Commission and we shall be entitled to their support, their help, their sympathy and to the extent that we receive these things, to that extent can we succeed.”

The principal speaker at the opening session, A. E. Heron, chairman of the State Board of Control, discussed the proposed reorganization of state departments having to do with natural resources. The unification of various bureaus dealing with agricultural problems at the last session of the legislature, he pointed out, has resulted in better coordination and proved advantageous in many ways. Hence, the plan is to continue the grouping of the numerous state bodies having problems in common so as to more effectively administer the state's business. The next step is to group the various boards of forestry, mines and state parks with the Fish and Game Commission under one head Department of Natural Resources. The director of this department is to be a member of the governor's cabinet. The Fish and Game Commission under the new grouping, Mr. Heron emphasized, is to function as in the past. Its autonomy is to be left undisturbed and it is still to control and have the use of its own funds.

Other features of the first session were papers on “Educational Work with Young Offenders” by Deputy W. B. Sellmer; “Dollar-a-Year Wardens” by Field Assistant Walter R. Welch; and “Game Propagation” by August Bade, superintendent of the State Game Farm. A synopsis of these papers is not necessary as two of them appear in this issue and the other will be printed in a future issue.

Mrs. Pearl Ford, assistant to the executive officer, gave a very interesting talk on a seemingly dry and featureless subject, “The Routine of the Executive Office in Relation to Employees.” Mrs. Ford stated that many surprises break the monotony of reading the stack of mail delivered to the Commission every day which she sorts out and delivers to the proper department. In one day's mail she received requests for information ranging from how to raise frogs, to requests for permits to keep crippled ducks, or to ship deer hides, and reports from fur trappers, on pollution, and on the good work done in the past by some warden.

The mock trial on the evening of February 8 will be long remembered by all. Wilful Violator with his glorious red shirt, flowing beard and stern, honest face, his dear loud wife, Burgundy, his huge stupid son, Vermuth, and his round, enormous daughter, Angelica, were a sight to move to pity the cold, stony heart of any judge save that of an Irishman. Unfortunately, for Violator the judge happened to be an Irishman who would have justice done in his court and who declared that it would be well done, too. As a result Angelica's streaming tears and Burgundy's broken cries were ineffectual. The prosecuting attorney was quick to notice the judge's keen sense of justice and with great adroitness drew forth the evidence to prove Violator's guilt. The attorney for the defense battled with wit and spirit and when the jury rendered a verdict of not guilty, his spirits rose. However, the judge would have justice over done and after telling the jury they were wrong changed the verdict.

In all, it was a jolly, good spectacle and kept the audience in an uproar. Without the humor of Judge Pat Parker, or the ridiculous objections of both attorneys, George Smith and B. D. Marx Greene, it is difficult to believe that the trial would have afforded so much wholesome enjoyment. Nor could the good points of law which were carefully brought out by both defense and prosecution be overlooked by those whose duty it is to know how evidence and witnesses should be used in a jury trial.

"The Viewpoint of an Onlooker" was the subject of a very able address made by Mr. Charles Dunwoody at the morning session of February 9. Mr. Dunwoody is secretary of the conservation section of the California Development Association and his address follows this review.

The discussion of law enforcement problems which J. S. Hunter led proved one of the most lively topics of the morning. The outcome of the discussion was to the effect that law enforcement depends not alone upon the energies of officials charged with the duty of apprehending violators, but also on the nature of the public sentiment back of it. Patrol Captain M. S. Clark, of the San Francisco district patrol, in demonstrating the right and wrong way of checking a bag showed the effectiveness of enforcing the law in a way to command the respect of the sportsmen rather than his contempt.

R. E. Ludlum presented a brief for the reasonable control of predatory animals stating that the problem was one worthy of the serious consideration of both the stockman and the game conservationist. "The damage to forage and other growing crops caused by rodents, each year, is very great; thus reducing the food supply available for both domestic stock and game. Predatory animals are nature's check on rodents and should be reasonably conserved for this purpose. The abundance of predatory animals must also be controlled so that they do not increase to the extent that they become a menace to domestic stock and game.

"In this connection," he stated, "the work of the commercial trapper can not be discounted. There were 3530 trappers in the field during the past season and the state had their services in the control of predatory animals without a cent of cost. These men made but \$73 each on the average and, unless fur-bearers like skunk, coon and fox are given

some protection, it will not be long before commercial trapping will be so unprofitable that the burden of predatory animal control will be placed on the state and will have to be paid out of state funds."

N. B. Scofield gave a history of the work and accomplishments of the Commercial Fisheries Department. An extended report of his remarks is appended, as it well serves to bring out the most extensive investigational enterprise into which the Commission has yet entered.

John Spencer, hydraulic engineer, discussed the screen and ladder problem. He stated that standard forms had been devised, installations were on the increase and that a systematic attempt was being made to see that ladders and screens throughout the state were functioning adequately.

The chief interest of the afternoon session centered about the addresses of W. H. Shebley and G. A. Coleman. Mr. Shebley has been called the dean of fish culturists and is one of the ablest men in the country in fish culture. His review of fish planting proved one of the most interesting and enlightening papers of the convention and readers of this periodical should with reason look forward to its appearance at a future date. Mr. Coleman's narration of his biological investigations of the food of trout and the conditions under which they exist strongly interested his hearers. Of especial interest was his explanation of the effect of wind action in the circulation of lakes. Only lakes less than twenty-five feet in depth have circulation to the bottom and a knowledge of this feature is as essential to have when a species of trout is to be planted in a lake as a knowledge of the adequacy of the food supply.

The executive officer, B. D. Marx Greene, told of the new program of fish planting in his usual forceful manner. In fact, credit is due the executive officer for the initiation of many features of the convention and for the general interest which he stimulated in it.

During the morning session of February 10, the California Academy of Sciences and Steinhart Aquarium were visited by most of the deputies. That the visit was of benefit is little doubted, for the opportunity afforded a chance to know more about the animals and fishes of the state. Many considered it a special privilege to be "back stage" to see the mechanics and system of operations of the aquarium.

At the afternoon session the United States district forester of California, Stewart B. Show, discussed the many problems and interests that the forest service and the Commission have in common. "We in the Forest Service," he said, "consider wild life conservation with the assumption that fish and game are to a very large degree a production of the forest, because it is obviously true that we mean by forest all forms of native cover in our mountain side. To a very large measure then, we of the Forest Service have an interest in the protection of fish and game.

"If we go a little more into detail, we find that both the Commission and the Forest Service have an educational department. Both of us desire to teach the public the purpose of our organizations and to make the public willing cooperators with us rather than apathetic enemies.

"Another angle in our mutual problem of fish and game development and administration is the relation of fires in forest country to fish and game. We have in many specific instances definite information about the magnitude of losses caused by fires. In one case in Butte County

last fall the remains of seventeen deer were found after a fire. The destruction of small game also is tremendously impressive and is likely to equal, perhaps exceed, in some cases the kill by hunters.

"This points directly to the necessity for the closest possible cooperation between the two groups. Both of us have before us education of the general public to the point of view that fires are highly detrimental, not only to the fish, but also to game which is a product of the forest cover. Our two groups working together can make a great deal of progress in teaching the people the truth of the matter."

State Forester M. B. Pratt spoke on the same subject of the inter-relationship between forests and game from the viewpoint of the state forester. He made it clear that though the fish and game deputy and the state forest ranger had interests in common, nevertheless, their services could not be effectively combined. The forest ranger would be deserving of severe criticism if he neglected his fire duties in order to prosecute a violation of the fish and game laws.

Dr. H. C. Bryant outlined the essential features of the educational program of the commission. Through the medium of an address on the difference between antlers and horns, he showed how natural history lore can be made attractive and how possible it is to awake the popular mind to the need and opportunity for a more sympathetic understanding of nature and her ways.

Deputy Ovid Holmes spoke on "An Educational Campaign Planned and Executed." He stressed the effectiveness of the Commission's activities in relation to its educational work in his own community and by means of several examples illustrated how the school children and business men of Fort Bragg had gained a new sense of their responsibility to the future in becoming alive to present day conservation of natural resources.

During the symposium in law enforcement which followed, numerous problems concerning the interest of certain localities with which particular deputies were familiar were brought to the attention of the assembly. Another notable feature of this section of the program was Deputy E. H. Ober's address on the mountain sheep of California's desert and high Sierra.

The central idea expressed at the convention in regard to law enforcement seemed to be that laws are unpopular because the public is not properly educated along the lines of law observance. Laws cease to be unpopular, however, when the public realizes that they are enforced not to prohibit hunting and fishing, but for the purpose of increasing the possibilities of sport and providing conditions the better to insure the increase of the state's fish and game by means of constructive methods.

Every citizen has an interest in the wild life of the state. The dawn of a new day will come when licenses are purchased not from fear of apprehension or arrest, but because the individual is in sympathy with the Commission, understands that the Commission is conserving the fish and game of the state for the benefit of this and future generations and desires to give his support to its program.

The session ended with a vote in favor of a service uniform for employees of the commission, these to be worn at the discretion of the owner.

The annual banquet brought the convention to a very satisfying close. Rolin G. Watkins was toastmaster and Irving Martin of the State Board of Control was the guest of honor. Superior Judge Pat Parker was also present. He was vested with the captaincy of the dollar-a-year wardens of Mono County as a token of the esteem in which the Commission holds him. President Zellerbach was in attendance and evinced again his lively interest in the Commission and his pleasure at being the head of so competent and loyal a body of protectors of the wild life of California.

The convention was a stimulating affair. Before it came, the majority of deputies knew of the Commission in the form of laws and reports, names and titles, observances and regulations. They were acquainted with its publications and with its executives and officials. Some had seen the buildings housing its hatcheries, and some few were familiar with the equipment of the fisheries laboratory. At the convention, however, employees looked into the faces of one another and knew that the Commission was a thing of life; a real living association of men, men with a vision.

Now the deputies have returned to their homes throughout all California; they know that the Commission is not a thing alone of buildings and names and reports. Yes, it was stimulating to be at the convention and all are looking forward to the next one when they can again consult and enthuse together.

THE DEPARTMENT OF COMMERCIAL FISHERIES.

By N. B. SCOFIELD.

When the California Fish and Game Commission was first organized it was purely a fish commission and it was interested mainly in the introduction and propagation of food fish. The first act of that Commission was to bring the shad to California from the Atlantic coast, and the shad is strictly a commercial fish. The first fish culture work of the Commission was in propagating the salmon which is mainly a commercial fish. A few years later the striped bass was brought to California from the Atlantic coast. This fish is valuable for both its food value and its gaminess and is sought by both the sportsmen and commercial fishermen which has led to a never ending conflict of the two interests.

The salmon fishery was the first to be developed in California and it was to guard against the over exploitation of this fish as well as to introduce food and game fish that the fish commission was established. It was not until later that there was fear of the extermination of the game. When this fear arose the duties of the commissioners were enlarged and the organization became a fish and game commission.

The salmon fisheries reached their peak of production and then declined and the game and sporting end of the Commission became the more important and sportsmen were invariably appointed as commissioners. About 15 years ago the commercial fisheries of the state began to grow principally through the development of the sardine and tuna industries until now our fisheries produce more than four hundred million pounds per year and the wholesale value of the fishing prod-

ucts is about twenty-five million dollars. This is greater than that of any other state in the United States but is surpassed by the Territory of Alaska.

With this growth of the fisheries industry has developed an added interest in the conservation of the fisheries and the Fish and Game Commission has made commercial fisheries conservation an important part of its work.

In most states where they have important commercial fisheries they are administered by a separate commission. There is an antipathy between sportsmen and commercial fishermen which is unreasoning and hard to understand. This antipathy is greatly increased when the two interests are administered by separate commissions. It is better to have them in one commission so that their differences can be arbitrated by one commission which will be without prejudice toward either side.

The first sardine canneries of importance in California were established at Monterey but real development of this industry did not begin until about 1913 or 1914. At about this time, or in 1912, to be more exact, the tuna canning industry was started in southern California and developed rapidly.

To take care of the increasing amount of work caused by the developing fisheries the Commercial Fisheries Department was established by the Fish and Game Commission. At first it was not recognized as a department and its development was very gradual. The department has now become an important part of the commission and has in its employ about 35 persons. The main office of the department is at San Francisco and there are branch offices at Monterey, San Pedro and San Diego. At San Pedro we have a State Fisheries Laboratory where most of the scientific or investigation work of the department is carried on. The work is divided into two divisions, Patrol or Law Enforcement and Research and Statistics.

The department is financed by the money received from commercial fishing licenses and from a tonnage tax on fish used for packing and canning so that the department is self-sustaining, with an income near one hundred thousand dollars.

In 1915 some scientific men held a meeting in San Diego—an organization called the Pacific Division of the American Association for the Advancement of Science. As some of the canners were worried about the future supply of the tuna, an afternoon was set aside to discuss the problem. The leading paper given that afternoon was by one of the canners, Mr. Steele of San Diego. Mr. Steele stated that there were a number of tuna canneries, something like fifteen, that had been developed in southern California and that more canneries each year were going in. Those already engaged in the business were doubling their capacity each year. They were getting more fishing boats and the industry was developing at an enormous rate. It was the belief that the schools of tuna, or albacore, were smaller than they had been and they were in fear that the tuna was being overfished.

The question asked of the scientists there assembled was this: "How much fishing will the tuna stand without a drop in the supply? We want to know whether we have reached the peak of production and should curtail our development. Should we avoid putting more money

into the industry, and go on what we now have, or should we increase our investment or should we reduce it?"

This was a very practical problem put to the men there and an answer could not be given. In fact, there was no clear idea expressed of how to go to work to get the answer. I kept the question in mind, however, and determined that the goal the department would aim at would be to strive to answer this very practical question. We would steer clear of devoting all our energy to the study of the life history of the fish and get our work on a basis where we could guard against overfishing by determining as soon as possible how much fishing a given species could stand.

Shortly after this I read a paper by Will F. Thompson on the "Problem of the Halibut," published by the conservation commission of Canada. The total annual catch of the halibut in the North Pacific had increased each year and no less a person than the head of the United States Bureau of Fisheries, Dr. Smith, at that time made the statement that the halibut fishery of the North Pacific was apparently inexhaustible. Thompson investigated the matter and found that the government had no records of the catches or data on which he could work and find out what was happening. So he went to the captains of the halibut schooners and found that these captains, practically all of them, had very accurate logs in which they noted the days they fished, where they fished, the gear used, and what the catch was each day. Thompson gathered together all the logs he could, and from that data, extending over a period of years, he was able to determine what was happening in the halibut industry. He found that the catch per unit of gear was rapidly decreasing. The reason that the total catch was increasing each year was that more gear was being used and more boats were fishing.

In addition, it was found that the numbers of larger and older fish were decreasing. It was noted in all the logs that the larger fish were becoming scarcer and scarcer so that the catch was being made up of increasingly younger fish each year. These were two unmistakable signs of overfishing. The banks of halibut were being rapidly overfished.

After reading Thompson's paper I was quite sure that he was just the man we needed to develop a scientific program for the care of the fisheries of California, and to look for an answer to the question asked by the canners at San Diego. Thompson was employed in 1917. With his help, and that of H. B. Nidever, we developed a method of getting an accurate record of the catch, so that it could be used to determine what the relative abundance of the fish is year after year.

The present system employed in the State of California, in getting data of the catch of fish, is the most perfect that is in use any place in the United States or in any country in the world. It is working splendidly and gives us all the information that is necessary so that we can tell what is happening in any fishery—whether the fish are getting scarcer, holding their own, or increasing.

When we speak of our scientific work it sounds rather formidable and difficult to understand, but the object to be obtained is rather simple and the program is a highly practical one. As stated before we want to find out just how much fishing the sardines, the tuna or the

striped bass can stand. We are attempting to find out and are finding out whether these fish are being overfished, whether we should let the fishing go on as it is, or whether we should ask for measures to restrict the fishing.

When we started this work there was no authority under the law for carrying on scientific investigations by the Fish and Game Commission. We asked for a law which was passed by the legislature which makes it the duty of the Fish and Game Commission to carry on these investigations of the commercial fisheries and to determine the very points we are working for in our program for the conservation of the fisheries. So our work is required by law and we feel that we are on a rather solid foundation and that this work will go ahead.

Through the data of the commercial catch which we get, we have a measure of the abundance of the different kinds of fish. All fish are subject to fluctuations in abundance which are due to natural causes, the most common of which is the failure or partial failure of the spawn to produce a crop during one or more years, and we must determine whether a reduction in the number of fish or a scarcity of fish is due to the fishing operations or whether it is due to natural causes or to both. To find this out necessitates, besides the statistical work, a biological study of the species in question to determine the age and rate of growth. We have to know the relative size of the age or year classes making up the supply of fish in the ocean or river of that one species. We have to know this in order to understand what are the natural fluctuations. This all sounds rather complicated but it is a part of the process any one goes through who grows chickens on his ranch, or cattle or any other animal. You must know how many you have, what your crop is each year and how many you can kill each year and keep up your supply. It is harder to find this out where fish are concerned for they are where they can not be seen and the ocean is a very large place. To determine the abundance of a species of fish through data of the commercial catch may be a crude way to take a census, but it is the best way which is known and it is certainly far superior to guess work such as has been followed so often.

Thus a scientific program has been developed in California for the care of the fisheries which I believe is the proper kind of program for any state or government to have. We are so sure, that we have banked everything on it, and I am doubly sure we are right, for the reason that the United States Bureau of Fisheries has accepted the program and is backing it up.

THE VIEWPOINT OF AN ONLOOKER.

By CHARLES DUNWOODY, Secretary, Conservation Section, California Development Association.

It would seem that a new day is dawning for the sportsmen of California. For years we have been handicapped by policies that have long since become obsolete. We have had laws on our statute books that were inadequate to meet the demands of progress. The sportsmen who have provided the funds that made the administration of their wild life resources possible in the past have had no voice in planning that work,

Enforcement of our fish and game laws had become almost a byword and violators had grown to such numbers that the law-abiding sportsman had almost lost confidence in his fellow man.

Today we have before us quite a different picture. The sportsmen of this state are now permitted to give an expression of their views to your group with that assured feeling that those same views will be properly considered in the molding of your present and future policies.

The Fish and Game Study Committee of the California Development Association with which you are all familiar sat for one year of arduous labor in an effort to draw a picture of the fish and game needs of California as it was seen by the sportsmen of the state. The Commission was kept informed from time to time of the recommendations that developed out of the deliberations of this committee. The Commission has demonstrated its ability to quickly recognize these necessary progressive steps and when the committee had drawn its work to a close an analysis was made of its proposed policy. It was found that in almost every instance the recommendations set forth in the policy had already either in part or in full been carried out by the Commission.

Every successful enterprise must be builded upon a foundation of confidence. In the case of your organization the foundation of your success is embodied in the confidence of the sportsmen of this state. That confidence can only be gained by the result of your constructive efforts. You have already taken a long step forward in gaining this confidence. This fact is reflected daily in the general attitude of the sportsmen throughout the entire state. One important factor in bringing about this general feeling was the courageous action on the part of your organization in divorcing politics from fish and game. Another pleasing factor has been the consideration on the part of your body of fish and game as one of the state's important, economic assets, and the provision for a business-like organization with which to administer it. In this respect let me say that you are extremely fortunate in having for your executive officer a man of vision who recognizes the true value of coordination. He has that happy faculty of consulting those who may be affected by his decisions in an effort to make them just and fair. He is basicaly sound in his policy of hearing all sides of a question before taking final action. Such a policy can not fail to win. Your splendid cooperation as evidenced by your dollar-a-year warden system is building a structure of law enforcement that can not fail to place California in the forefront in this respect. Your recognition of the necessity of complete cooperation between forestry and fish and game offers another factor in the sound development of your policy. I believe the day has passed when we can ignore the protection of the house in which our game lives and the food that nature has provided for the purpose of making possible its subsistence. A forest fire to a game warden should mean to him exactly the same thing as the burning of the buildings on one of the state game farms and the destruction of the available supply of feed.

Through your constructive work you are each day bringing about in the minds of those who do not indulge in either fishing or hunting a better understanding of the economic importance of fish and game to this state.

Your efforts in bringing about educational programs in the schools is another item worthy of commendation. In addition to instilling a

spirit of protection for wild life into the youngster you are planting in him the desire for an out-of-door life which if realized can not fail to develop clean minded men and women in the coming generation of Californians. It is a recognized fact that the largest percentage of clean square shooters is found in those who love the out-of-doors. Public education is essential if the people are to be expected to cooperate. As long as conservation is a dominant factor in the perpetuation of our fish and game, the people of California must accept fish and game as a responsibility as well as an opportunity. Your job is to make them visualize their responsibility. We must sell to our people the idea that fish and game has a real value measurable in dollars and cents in that it makes the state more attractive for the habitation of man and adds materially to the sale value of every acre of land within the radius of its influence. If the public once gets that picture your problem of lack of funds for propagation and protection will quickly vanish.

In closing I will sum up my vision of your organization in one sentence which I wish could be indelibly impressed into the minds of each of you. You are building today upon yesterday's accomplishments for tomorrow's achievements.



CALIFORNIA FISH AND GAME

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All material for publication should be sent to H. C. Bryant, Postal Telegraph Bldg., San Francisco, California.

May 25, 1927.

"If you hunt or fish, be a real sportsman. There is more honor in giving a square deal than in getting the limit."

INCREASED HUNTING AND FISHING LICENSE FEES NEEDED.

Sportsmen for several years have supported a move for better financial support of Fish and Game Commission activities through increased hunting and fishing license fee. In a state like California where wild life resources are great and where sporting demands are very heavy the need of better financing has become apparent to all. To improve patrol takes more money. To rear and plant more fish and more upland game birds increased funds are necessary. This need of increased fees was almost attained at the last session of the legislature and it is practically assured of attainment at this session because of both administrative and general support.

A considerable sum of money, something like \$49,000, may be saved by revoking the ten cent fee paid for selling licenses and placing the entire distribution under the Bureau of Finance and Accounts. A state containing 158,247 square miles needs more than eighty game wardens to properly protect wild life resources. An increased pond system and thousands of brood fish are needed to supply eggs for the hatcheries and new buildings and equipment are necessary if an increased number of fish are to be planted to care for increased demand. A new patrol boat for the Commercial Fisheries Department will better cope with violators who deplete the marine fisheries. Educational and research work can be made to function more adequately with increased support. Never has screen and ladder work received the

financial support this important project deserves. Continual drainage of lakes and marshes has necessitated making provisions for the purchase and supervision of wildfowl refuges if our supply is to be maintained.

That plans have actually been made for properly utilizing the enlarged income from the proposed increase of licenses to \$3 for a single hunting or fishing license and \$5 for a combined license, is indicated by the following outline:

1. Administration.

The only material increases are in the employment of five additional branch cashiers, and extra clerical help to care for the sale of licenses by the Commission itself, which is compensated many times by the saving of \$57,500 now allowed for the commissions paid to county clerks and license agents. The total increased cost of distribution to the Commission will be less than \$8,000 annually, a saving, therefore, of about \$49,000. Additional allowance is made for extra cost of printing new licenses and for deer tags.

2. Law Enforcement.

The new budget provides for five additional captains, 50 additional deputies, one additional launch patrol captain, two additional lion hunters, ten game refuge tenders, and extra clerical force.

Provision is made for increased allowance for traveling expense account, new deputies and employees, and increased lion bounties from \$7,500 to \$22,000 per annum.

Provision is made for three new speed boats, ten outboard motors, six collapsible canvas boats, and full fish rescue equipment.

Provision is made for fencing and posting present game refuges at an expense of \$15,000 per annum over a 4-year period, and \$20,000 is allowed for constructing cottages in game refuges for refuge tenders.

3. Fish Culture.

Two new assistant biologists are provided for. One additional hatchery supervisor. Hatchery foremen increased from 17 to 25. Foreman assistants increased from 37 to 60. Watchmen are increased from two to five, and adequate provision is made for extra help.

The fish food is increased from \$36,000 per annum to \$48,000 the first year, then to \$60,000, then to \$72,000, where it stays constant; this is the food required for the brood fish which we expect to raise in our own brood ponds.

Adequate provision is made for the expense of a biological survey of lakes and streams.

Thirty thousand dollars per annum is allowed for fish planting, for hire of men, trucks and packing equipment. We will do all our own planting. Under equipment, new trucks are provided for the new hatchery, and 500 fish distributing cans per year.

Provision is made for two new fish distributing cars to cost \$40,000 each and for 10 new hatcheries to be constructed over a period of four years in certain strategic positions.

Provision is made for two pond systems, each to cost \$50,000, where the commission proposes to raise its own rainbow trout, instead of taking them in racks and traps.

4. *Commercial Fisheries.*

Provision is made for a new outside boat to cost \$60,000 and for adequate crew to man it. Allowance of \$15,000 is made for scientific apparatus to be installed on the boat.

NOTE—All of these items come from commercial fisheries revenue and not from increased license tax.

5. *Education and Research.*

Provision is made for a zoologist and for a librarian. Considerable increase is given for printing bulletins, in raising the allowance from \$1,250 to \$2,500 per annum.

Provision is made for a laboratory and for a moving picture operator to take our own pictures.

A sufficient sum is allowed for additional lecturers to take care of crowds at summer camps.

Provision is made for increasing the circulation of fish and game magazine from approximately 7500 copies quarterly to 60,000 copies quarterly. It is proposed to have a very general circulation through service groups and other agencies.

6. *Statistics and Game Problems.*

This is now made into a new bureau and allowance is given for a director, a bacteriologist and a pathologist.

Adequate provision is made for a laboratory and annual supplies.

7. *Bureau of Hydraulics.*

This includes screens, ladders, and pollution. Additional help is provided for and equipment so that Bureau can function properly.

8. *Game Propagation.*

Provision is made for a new game farm at a cost of \$30,000 and for additional help to maintain it. New auto trucks are provided for both farms so that we can adequately care for our planting.

9. *Permanent Improvements.*

It is planned annually to set aside \$175,000 for the purchase of land for game refuges and public shooting grounds, which sum includes fencing, posting, and the construction of cottages in each.

DISCRETIONARY POWERS.

Constructive conservation of fish and game resources in California are dependent upon:

1. Legislation suited to the requirement of localities rather than whole districts.

2. Increased protection for fish and game under abnormal conditions. The closing of certain streams after fry have been planted in order to give them a chance to develop to the spawning age.

At the present time, the California Fish and Game Commission is powerless to give added protection to fish or game in time of emergency, or to suit protection

to any locality. A law providing for discretionary powers is a law much needed at the present time. The action of the 1927 legislature will settle the matter as to whether more efficient conservation work can be accomplished in this state.

ACCOMPLISHMENTS VS. FUTURE PROGRAM.

Future plans should be made after reviewing accomplishments of the past. As a consequence, nature lovers may well review Dr. Hornaday's list of accomplishments in game conservation which are as follows:

1. Killing of nongame birds stopped.
2. Killing of game restricted to closed seasons which have steadily grown shorter. Long closed seasons for threatened species.
3. Sale of game prohibited both federal and state law.
4. Suppression of killing for millinery trade.
5. Creation of both state and federal refuges.
6. Limitation of destructive agencies.
7. Federal protection.
8. Propagation.

What are the stepping stones that should be added to these? At least three should receive immediate attention. Perusal of sportsmen's conservation magazines will quickly bring them to light. They are:

1. Extensive game refuges for water-fowl.
2. Administration of fish and game resources by trained experts.
3. Plenary powers for fish and game commissions in order to provide immediate action in cases of emergency.

CONSERVATION NECESSITIES.

Unless those interested in the conservation of our natural resources occasionally review the many factors which militate against the abundance of fish and game, improvement of conditions can not be expected. Of course, such a review always brings to mind how man continually upsets the balance of nature. Were it not for certain results obtained where interest in conservation has been developed, it would seem almost a hopeless task to improve conditions under modern civilization. Not only does man lay his destroying hand on the wild life of forest and field and the dwellers of the streams, but he pays little attention to the life requisites of fish and game. Most of his works are hostile to the success of wild life. He turns the sewage of his cities

into the nearest stream; the refuse of his factories, the sawdust of his mills and the refuse oil from his ships add to making the waters impossible as homes for fish. Even the automobile becomes a juggernaut of destruction to every form of life that crosses a highway on a moonlight night, as any paved road will demonstrate with its mutilated bodies.

One ray of hope looms on the horizon. There really is increasing interest in saving what wild life resources are still left. This interest is evidenced in the rapid growth of fish and game protective associations and the final unifying of them in California; it is evidenced by the numerous bills attempting better protection for various species which flood every session of the legislature; it is evidenced by attentive ears of service clubs and other organizations when conservation is mentioned.

Proper conservation in California is dependent first upon the requiring of needed data relative to the life history and habits of the various species, and second upon the united interest and activity of the state's citizenry.

IN MEMORIAM.

W. J. GREEN.

For many years, the man who unceasingly followed up reports of violations, the man who kept the markets under observation and the utility man called upon in every emergency was Deputy W. J. Green. He departed this life January 17, 1927, after an illness covering more than a year that partially incapacitated him physically but not mentally. To the last he was a most loyal employee and devotee of conservation.

He knew the violator and how to handle him, and was untiring in his efforts playing no favorites in his work. Those who knew him at Sacramento say he might be found at any hour of the day or night around the railroad stations and express offices watching for illegal shipments of fish and game.

W. J. Green was born in Perris, Kentucky. At seven he was in the saddle and a few years later became one of America's best known jockeys. In his early days he rode for Richard K. Fox, Marcus Daly, James R. Keene, and many other equally well known turfmen. The tracks at Windsor, Ontario, New Orleans, Louisville, Lexington, Saratoga, Sheepshead Bay—all these and many others knew him and his sterling efforts to put his mount under the wire, a winner.

Mr. Green became a deputy of the California Fish and Game Commission on November 1, 1911. The deceased leaves a widow, Mrs. Mary A. Green, and two stepchildren, C. R. Spickard, of Sacramento; and Mrs. Hilda L. McFall, of Auburn.

ANOTHER GAME FARM CONTEMPLATED.

Demands for an increasing output make it imperative that another game farm, the birds of which are to supply southern California, be established. Plans are that it will be modeled after the game farm at Yountville, with the exception that metal will be used for superstructure instead of wood thereby reducing depreciation. An adequate sprinkling system will be installed in order that cover and green food will be plentiful.

QUALIFICATIONS OF A GAME KEEPER.*

Ability to breed wild game in captivity and bring it to maturity in considerable numbers may well make its possessor proud. So far, however, only the first of the three major steps has been taken in so far as meeting the requirements of the gunner is concerned.

The activities of an entire breeding season wholly successful though they be, may and many times have been practically nullified by lack of experience in placing and holding game thus produced in natural or created covers.

Assuming that this can be done, our applicant still lacks the final step to qualify as a gamekeeper. Covers well stocked with game are not of avail unless the game can be brought to gun. No further exposition of this feature is needed before a gathering of sportsmen and I am sure all who hear me will agree that ability to bring game to the gun is a rare and worth while accomplishment.

Recapitulating, it is easily seen that a gamekeeper must be steeped in knowledge of nutrition and sanitation as applied to his particular problem; the natural history and habits of at least the commoner game species; the ways of vermin, winged and mammalian and, finally, the lore of the game cover.

With all this knowledge, however, he will not succeed unless his heart is at-

*The above are excerpts from an article entitled, "Our Main Dependence for More Game—the Gamekeeper" by E. A. Quarles, which appeared in *American Game* (Vol. 16, No. 1, p. 11.)

tuned to his work. The spirit that dominates him must rise superior to the wrack of days whose active hours makes a sweat-shop worker's situation seem enviable by comparison were it not for the sheer fascination of the thing he is seeking to accomplish and the intimate contact with nature and her ways which is involved.

INSECT FOOD FOR YOUNG PHEASANTS.

Needed insect food for young pheasants has always been a problem. The following letter from Smith Riley suggests a unique method of artificially furnishing a supply:

Dr. H. C. Bryant,
Museum of Vertebrate Zoology,
Berkeley, California.

Dear Mr. Bryant:

I was much interested in your article about the Yountville Game Farm,* and the provision for plant culture in the bird yards in order to attract insects. I do not believe there is full appreciation of the importance of insect food in bird culture. It has always occurred to me that the insect and green food was of greater importance than all the prepared foods placed on the market, the recent preparations containing codliver oil not excepted though adding the oil has been a great step forward in chicken starters.

Somewhere here in the east there was a man who raised some ruffed grouse by feeding them each day a cricket or two which he caught by placing burlap sacks on the lawn.

Down in Alabama a man has been quite successful in raising the black field crickets which he has been selling for fish bait. It has occurred to me that crickets or grasshoppers might be raised for bird food. I understand that some experiments have been going forward at Cornell in the production of the eggs of fruit flies to be used in raising pheasants and grouse. To have a batch of young insects such as crickets or grasshoppers on hand when the young birds are sufficiently active to tie into them should be better than eggs as an all around food. One of the greatest grouse districts in the United States has been the sand hill region of Kansas and Nebraska where the nymph of those big lubber hoppers are just getting active when the hatching season occurs.

Not knowing much about crickets I collected a small cage of them late last summer and watched them through the fall and early winter, after securing what information I could about their habits and food requirements from Dr. Howard of the U. S. Dept. of Agriculture. My hens laid a multitude of eggs during September and all through October. Not being smart enough to realize the importance of moisture I lost my eggs by allowing the ground to dry out during the winter. If I had placed the boxes of soil in which the eggs were deposited in the ground so the rain and the snow would have kept the soil moist I should

have had more small crickets this spring than some people have hay.

Dr. Howard tells me the enemies of crickets and grasshoppers are birds, small mammals, various predacious beetle larvæ, parasitic insects, mites and nematodes. He advises placing the foundation of a cage at least twelve inches in the ground and making the covering of 16 to 20 mesh wire cloth. A New York concern quoted me a price of \$12.50 per roll of allweather metal cloth 18 inches by 100 feet or 150 square feet. I had thought of building an experimental cage ten feet long, four feet wide and four feet high using a 2x12 timber for the base and 2x2 or 2x4s for the frame above ground. Additional units of this size could be constructed if it was considered advisable to extend the experiment or carry out the activities with more than one kind of insect.

The crickets will pass the winter either as eggs in the ground or nymphs under what debris is offered for protection. The nymphs stand very much cold and if the cage is provided with bark and an abundance of old leaves, etc., it is very probable that even the smaller nymphs will live over winter. It would be well to put some small pieces of weathered logs in the bottom of the cage to provide satisfactory crevices in which the smaller nymphs can crawl for protection from the adult crickets. The crickets that over-winter as nymphs will mature in June and July. Those that hibernate as eggs will not mature until August or September. So with a sufficient number of breeding crickets on hand one should have a supply of young crickets of most any size which would be good food for birds of different ages, throughout the growing season.

Crickets are not necessarily grass feeders, but prefer dried organic material, dried grass, rotten wood, partially rotten rags and many other related types of organic food. I found that moisture is essential and that some animal food such as meat or fish meal is necessary to prevent cannibalism. I found that clumps of growing grass are very attractive to the crickets not so much as food but as shelter and they appeared to drink the moisture from the blades of grass when it was sprinkled. The cage should have sandy soil as the eggs are deposited in the ground. Some of my hens dug holes in the soil an inch or so in depth, and some thrust the oviduct into the soil without digging. Those making holes always filled them up after depositing the eggs. It was interesting to watch the hens carry gravel and place the particles over the location where he oviduct had been thrust into the soil to deposit the eggs.

It may be that you have some other kind of insect in California that would be more suitable for experiments of this kind than the black field cricket, or one of the more numerous grasshoppers. Both the crickets and some kinds of grasshoppers over-winter in this region in different forms as I have seen adult crickets and grasshoppers so early in the spring that they could not have been of the season's hatching.

I want to know if it will not be possible to carry out some insect culture experiments at one of your game farms looking to the production of a sufficient supply of insect food to successfully raise different kinds of game birds? To raise turkeys one must have insects and turkeys

*Bryant, H. C. 1926, California's new state game farm. Calif. Fish and Game, Vol. 12, No. 1 (Jan. 1926), pp. 10-13, 3 figs.

are the finest game birds of which the United States can boast. We have done little with turkeys and practically nothing with grouse.

Very sincerely yours,

(Signed) SMITH RILEY,

Box 204, Greenlawn, Long Island, N. Y.

PHEASANT SEASON DISAPPOINTING.

Hunters from Los Angeles, who made the trip into District 4½ for the pheasant season which opened on December 1st, returned with stories of many valley quail bagged. In plain words the 1926 season on pheasants was a disappointment to most of the hunters. On the opening day it is estimated that there were 200 nimrods in the field for ring-necks and the number of birds killed during the first two days of the season averaged approximately one-half bird per hunter. A liberal estimate would be 200 pheasants killed during this week, by far the greater number being taken near Bishop.

Approximately 100 hunters in Owens Valley during the first week in December were from Los Angeles and vicinity. The balance of the hunters were local people. Not more than eight limits of birds have been accounted for and many of the hunters failed to obtain a pheasant. Ninety per cent of the birds killed were of this season's hatch.

The fact that many of the large ranches in Owens Valley were closed to hunters and that very few hunters used dogs accounts for the small number of pheasants killed. Considerable protest was made by visiting hunters who were unable to hunt on posted lands where pheasants were reported abundant. Owners of ranches closed to hunting claimed their action justifiable on account of danger to stock. There is, however, a general sentiment among residents in Owens Valley in favor of a closed season on pheasants.

A NEW BOOK ON GAME BIRD PROPAGATION.

The pioneer pheasant propagator of Oregon, Gene M. Simpson of Corvallis, has just published a booklet of almost a hundred pages on "Pheasant Farming." Mr. Simpson has an enviable reputation and much experience as a raiser of game birds, especially the Chinese ring-neck, and this book has been put out to answer the many inquiries he receives concerning them. Amateur pheasant breeders will find it of value, for it goes into considerable detail on farm equipment; hatching, brooding and brooders; preparation of food for both growing and matured birds;

their enemies; and the best methods of rearing pheasants in captivity, shipping birds and eggs, and liberation. Biologists agree with him in placing the rat and "semidomestic" cat under the ban, along with the sharp-shinned and Cooper hawks and the great horned owl, but may not subscribe to the trapping and poisoning of the western red-tailed hawk and the common crow as advocated in this book, even though the latter is not protected in Oregon.

There are also chapters of general interest on the history of the propagation of pheasants and their habits both in confinement and in the wilds, on the Chinese pheasant as a game bird, and on the protection of the pheasant hen. One of the last two chapters of this book gives the details of Mr. Simpson's recent remarkable success in breeding the Hungarian partridge in captivity, and the other more briefly tells of the successful raising of the wild turkey. These notable feats of game bird raising were accomplished at the Eastern Oregon State Game Farm at Pendleton. Mr. Simpson is in charge of the three Oregon state game farms, at Pendleton, Eugene and Corvallis.

IMPORTATION OF QUAIL FROM MEXICO.

The season of 1926 proved the third largest for the entry of quail from north-eastern Mexico since importations began in 1910. The total number imported was 37,134, of which 10,000 were entered at Eagle Pass, Texas, between February 17 and 26; 1737 at Laredo between March 10 and April 24; and 25,397 at Brownsville between February 15 and April 24. As was the case last year, shipments were regulated through concessions granted by Mexican authorities, the entry of 10,000 being authorized at Eagle Pass, 10,000 at Laredo, and 50,000 at Brownsville.

Inspectors of the Bureau of Animal Industry examined all shipments at the border, but found no quail disease. Weekly reports were made on the condition of the birds and the details of the shipments, thus furnishing a complete check on the destination of entries. Nearly all were shipped to points south of Pennsylvania and the Ohio River, as follows: Texas, 5721; Oklahoma, 10,000; Kansas, 4969; Missouri, 515; Mississippi, 4980; Alabama, 4162; Georgia, 922; Kentucky, 3399; Maryland, 700. Of the northern states, Illinois received 662, New York 250, and other states 224. An interesting fact in connection with these importations

is that three of the principal states—Kansas, Oklahoma and Texas—that received Mexican quail furnished most of the stock for other regions twenty years ago, and in Oklahoma 1000 quail were reintroduced at a point from which some of the largest shipments were formerly made.

The number of quail imported from Mexico since shipment began in 1910 now aggregates about 266,000, nearly all of which were bob-whites. A few requests were received this season for entries of quail from other parts of Mexico, but because of the requirement that export permits must be obtained from the Mexican authorities before shipments are

each.—Annual Report, Chief of Bureau of Biological Survey, 1926.

EXPERIMENT WITH TROPICAL GAME BIRDS.

Attempts have been made during the past two years to introduce and acclimatize certain tropical game birds, including tinamous, curassows, ocellated turkeys, and chachalacas on Sapelo Island, Georgia. The chachalacas are breeding freely in various parts of the island and the curassows are showing signs of a desire to breed. Experiments with other birds so far have been unsuccessful—



FIG. 25. Exhibit at annual Christmas party of Palo Alto merchants installed by the Palo Alto Rod and Gun Club with the cooperation of the California Fish and Game Commission. Deputy W. B. Sellmer arranged this effective exhibit.

made, comparatively few birds crossed the border.

At the request of some of the game commissioners and other persons interested, the Tariff Commission during the summer of 1925 made an investigation of the cost of capture and shipment of Mexican quail, and as a result the import duty on bob-whites was reduced in October from 50 cents to 25 cents each. The experience of the past season indicates that this reduction had little, if any, appreciable effect in increasing the imports, since the number entered was less than in 1925, when 39,170 birds were entered subject to a duty of 50 cents

each.—Annual Report, Chief of Bureau of Biological Survey, 1926.

PHEASANT FILLS NEED IN IOWA.

The state of Iowa presents an extreme example of the crowding out of wild animal life, once extremely abundant, by cultivation of the land. W. E. Albert, state game warden of Iowa, told the delegates at the National Game Conference in New York in December that even the small percentage of swamp and rugged land in that state had been made use of by farming and that there remains practically no wild cover for game.

This condition precludes the restoration of the native species to any extent, such as the prairie chicken, ruffed grouse, or even the local ducks, whose nesting places have been appropriated and drained.

In this juncture, says Mr. Albert, attention was directed to the pheasant, a foreign immigrant, which was introduced in limited numbers some fourteen years ago. The species is now firmly established, its greatest abundance being, paradoxically, in the most intensely cultivated sections of the state. Mr. Albert explains this by the assumption that in such sections there are fewer predatory animals than in the wilder sections to prey upon the pheasant.

Speaking of the prejudice that exists in some quarters against the pheasant as a destroyer of farm crops, this state official says he has found the evidence largely on the side of the bird. Instances are cited of complaints of pheasants pulling up newly sprouted corn. When pheasants suspected of this depredation were killed their crops were found filled with cut-worms, the real corn-destroying culprits, and no sprouts of corn. Other noxious crop-destroying insects were identified in the stomach contents of the birds.

The pheasant does eat some grain, it is true, when insect life is not obtainable, which the farmer can well afford to permit in return for the services rendered during the summer when insect life is abundant and when the pheasant prefers the insect food in preference to anything else.

Mr. Albert also said that he has not been able to obtain any evidence that the pheasant crowds out any other species or is a disturbing factor to other game birds as quail and Hungarian partridge both thrive in suitable cover, along with the pheasant. The latter is most numerous where the pheasant is most abundant.

STATE REFUGES FOR WILD FOWL.

Several editorials and articles in current periodicals show that sentiment is more and more favoring a plan for state ownership of wild life refuges as a substitute for the proposed federal game refuges and public shooting grounds. One thing that has prevented activities by the state has been the lack of funds and of course the same thing has applied to the government.

Increasing sentiment in most states favoring an increased license fee is obviating this difficulty and California along with several other states is launching out on a plan to furnish wild fowl refuges

in order to improve wild fowl shooting. The hunting seasons of the past three years have been so much below normal that every conservationist has been brought fully to the opinion that without food and cover, ducks can not be expected to stay within a state. California's extensive marshes have been drained and with the exception of the gun clubs, little marshland is available as attractive places for waterfowl. It hardly seems possible that the breeding stock has been seriously diminished, as there is much evidence to show that thousands of birds arrive early enough farther south at better feeding grounds. If the state will not only restore Lower Klamath Lake but also add numerous wild fowl refuges to its refuge systems, ducks are sure to again appear in numbers.

Already there are rumblings regarding the way in which a federal license fund might be expended. Eastern sportsmen will not wholeheartedly approve of spending large sums in the west which will do the eastern gunner no tangible good. An increased hunting license fee in California will provide funds, which through the years will assure a fine series of wild fowl refuges and the future of duck shooting will then be properly cared for without interference by the government.

CONFISCATION OF NET DECLARED LEGAL.

Superior Judge Fred A. Treat, of Monterey County, recently brought to a close one of the most important cases having to do with commercial fisheries when he declared the large purse seine owned by Andrew Zambarlin, deep sea fisherman, be forfeited as a nuisance, and ordered the California Fish and Game Commission to confiscate the net and sell it. The net is valued at \$4,000, and the money realized by the commission from its sale will be turned into the fish and game preservation funds.

Zambarlin was one the purse seine operators employed by the Ocean Industries, Inc., a Nevada corporation, which undertook, early last winter, to operate a fish reduction plant, in violation of law, aboard the old concrete ship, *Peralta*.

WHAT DO SEA LIONS EAT?

The International Fisheries Commission was recently asked by fishermen of southern California to devise a scheme to rid the southern waters of sea lions, which they claim are killing off large numbers of fish.

The Fisheries Commission took the matter under advisement. Meanwhile

the Commercial Fisheries Department of the California Fish and Game Commission has begun an investigation to determine the food habits and economic relations of these sea mammals as a basis for future action. It is not known whether valuable food fish are taken in quantity. It is known that other food than fish is to be found in their diet. At present the sea lion is protected in the Santa Barbara Channel but given no protection in the north. Several years ago, the Oregon Fish and Game Commission, at the request of fishermen, hired a man to kill sea lions off the coast but did not gather data as to stomach contents nor were the thousand killed put to any use. The actual economic relations of these

shipment contained as many as 360,000 birds. While our laws prohibit the importation of the plumage of these and other wild birds when it is detached from the bird they do not prohibit its entrance when it is still part of the bird. We, therefore, have been powerless to prohibit the import of these birds into our country.

Argentina, at last, becoming alarmed by the growth of this trade and consequent decrease of the birds in that country, has fortunately taken the matter in her own hands. Realizing the value of her assets in game birds under adequate protection, she has now not only prohibited export at all times, but also their sale and transport in her own territory during the closed season. This action on



FIG. 26. King salmon caught by G. H. Clark at the mouth of the Klamath River, fall, 1926. Photographed by H. C. Roberts.

animals should certainly be studied before control measures are begun.

ARGENTINA PROHIBITS THE EXPORTATION OF TINAMOUS.

With unbounded satisfaction we learn from Dr. Roberto Dabbene of the National Museum at Buenos Aires that Argentina has passed a decree prohibiting the exportation of Tinamous. At intervals for the past three years Dr. Pearson and Dr. Chapman have been working to see this end accomplished. Various species of these partridge-like birds have been shipped from that country in cold storage to the port of New York to be sold as game. Of recent years this trade had grown to such proportions that a single

the part of Argentina marks a notable step in the history of the conservation of wild life in South America.—*Bird Lore*, Vol. 28, No. 5.

COMPLETE YOUR FILE.

The supply of two issues of CALIFORNIA FISH AND GAME, volume 1, No. 1 (green cover) and volume 7, No. 1 (Salmon number) is entirely exhausted and several other numbers are so reduced that they can only be furnished libraries to complete sets. On the other hand, a sizable stock of certain other numbers, some of them as far back as volume 1, No. 2 and No. 3 has been located and these are available to those who wish to have a complete file. Now is the time to

discover your needs and fill them. If you will discover what numbers are missing, the Bureau of Education and Research will be glad to supply your needs in so far as it is possible from the stock now on hand. Delay will reduce your chances of securing needed numbers.

VARIETIES OF TUNNIES AND SWORD FISHES DESCRIBED.

Most descriptions of animal life are made from museum specimens, either stuffed or preserved in spirits. Scientists have found difficulty, however, in securing proper material on which to base descriptions when dealing with large forms, consequently, Dr. David Starr Jordan and Dr. Barton Warren Evermann in a joint paper* on giant mackerel-like fishes which range from 20 to 1400 pounds, have turned to photographs for museum material. After collecting a large series of photographs, the authors have given the first dependable list of species yet made available, although Zane Grey in his "Tales of Fishing Virgin Seas" has given many valuable records. A key to families and to species is given and a series of twenty plates illustrates the paper. Believing that many readers might be interested in the less technical write ups on several of the best known game fishes, we are reproducing them herein.

THE LEAPING TUNA, BLUEFIN.

"This is the 'leaping tuna' of the California coast, the most appreciated of our game fishes. It probably breeds in the open sea. The adult fishes abound among the Santa Barbara Islands, especially about Santa Catalina. Its northern limit is about the mouth of the Columbia River. (John Gill.) Its southern range extends well into Mexico. The largest tuna taken with hook and line at Santa Catalina weighed 251 pounds, but the species reaches nearly double that size. From the European tunny (*thynnus*) this California form differs mainly in the longer pectorals. It seems to be nearer the European species than the tunny of the Western Atlantic (*secundodorsalis*), if, indeed, all three are not forms of the same one, the variations due to defects of the artists rather than to peculiarities of the fish."

LONG-FINNED ALBACORE.

"The long-finned albacore is very abundant in Japan, Hawaii, and off the shores

*Jordan, David Starr and Evermann, Barton Warren, 1926. A review of the giant mackerel-like fishes, tunnies, spearfishes and swordfishes. California Academy of Sciences, Occasional Papers, Sept. 30, 1926, pp. 1-72, 20 pls.

of southern California. It has the upper finlets yellowish, bordered around by black, the body a little more slender, and the snout a trifle more acute. The color of the finlets is more yellow than is recorded of the Atlantic form. The species is usually from 20 to 65 pounds in weight, the largest recorded from Santa Catalina being 65 pounds. The flesh of this species, contrary to our first impression (Jordan and Gilbert, 1880) is pale and of agreeable flavor. It has been for several years prepared as a condiment, in tin-cans, in southern California, and sold under the name of tuna. Of late years the Oceanic Bonito or Aku (*Katsuwonus vagans* Lesson) has been thus prepared in Hawaii and southern California and in still greater abundance the leaping tuna (*Thunnus saliens*) and the yellow-fin albacores (*Neothunnus macropterus* and *N. catalinae*) are now similarly treated."

YELLOWFIN TUNA.

"The species grows to a weight of 300 to 400 pounds; the one here figured weighed 157½ pounds. About Santa Catalina it is a valued game fish. Its southern range is not yet known; but between San Diego and Cape San Lucas it seems to give place to the tropical *Neothunnus macropterus*. Few or none of these large fishes, in their range, cross the Tropic of Cancer."

BARRED MARLIN.

"This species is very abundant in the deep seas about Hawaii, whence it is brought into the market every day, at least in the autumn season. The largest one seen by us weighed 780 pounds. It is also abundant about the Santa Barbara Islands where it is much sought as a game fish. The largest recorded from Santa Catalina weighed 339 pounds. Now that Japanese fishermen enter the deep sea, the species is well represented in the markets of all the larger cities from Japan. The original figure of this species from a mounted example (added to our published notes by Dr. Mitsukuri) must represent this species, although in form not quite like our examples. This is probably due to distortion, and our other references all must refer to this species."

BROADBILL SWORDFISH.

"This species is recorded from both sides of the Atlantic, on each of which it is an important food fish of excellent flavor. We have also examined photographs of examples from off southern California, especially about Santa Catalina Island, Hawaii and New Zealand. Ex-

amination of photographs fails to show any specific distinctions from the excellent plate in Storer's Fishes of Massachusetts. Very slight difference in the length of the sword and that of the pectoral fin may be noted.

"The largest swordfish taken by an angler, of which we have record, was secured in the north Atlantic by Mr. Zane Grey. It weighed 578 pounds. The largest taken at Santa Catalina was obtained by Mr. Frank A. Gillespie in June, 1925, and weighed 571 pounds. This species is said to be very abundant off the coast of Lower California, especially northward."

It can be seen from these quotations that this review of the tunnies, spearfishes and swordfishes contains considerable material of interest to the angler, especially

be a typical cane-gun capable of firing a .410 caliber shotgun shell. This is the sort of weapon sometimes used by southern Europeans in securing protected song birds. It is considered a concealed type and inimicable to proper game protection. As a consequence, the violator when taken before Justice Ray Griffith was assigned a fine of \$100 and the gun was confiscated.

AFRICAN CONSERVATIONISTS HAVE NEW TROUBLES.

American conservationists think they have trouble enough in attempting to deal with the depredations of the various species of game. Some states have endeavored to reimburse farmers for actual damage done but such trouble in connec-



Fig. 27. Songbirds killed by four Italians and confiscated by Deputy W. B. Sellmer at Blackpoint, Marin County. The collection contained everything from a humming bird to a quail. Violators pled guilty and were fined \$600 by Judge Rudolf, of Novato.

to the angler interested in sport fishing in the Santa Barbara Channel.

CANE GUN ILLEGAL IN CALIFORNIA.

Game Warden John Burke, of Daly City, was recently attracted by the strange actions of some man moving about in the brush. On approaching the man showed himself a violator by showing fight. The warden received several blows from a cane which had all the appearance of a malacca walking stick. However, when it was confiscated, it was found to be a cane-gun of French manufacture. When the tip of the cane was removed, a movement of the handle disclosed a trigger and the walking stick proved to

tion with devastation of crops are of minor character as compared with the trouble met in the movement for African game protection as reported by Herbert Lang in *Natural History* (volume 24, pp. 313-28). Besides devastating crops, elephants by merely walking over wooden bridges cripple traffic and giraffes intercept communication by breaking telegraph wires. Zebras stampede through the strongest fencing and endanger both crops and domestic stock; rhinoceroses and buffalos become dangerous when gathered in herds.

DUCK DISEASE.

For several years past it has been evident that a large toll of ducks has been

taken by some strange disease, the exact cause of which has not been ascertained. The disease, in some instances, has been termed alkali poisoning and yet there is much evidence to show that in some places where large numbers of ducks have died some other cause was more potent. That the toll taken amounted to thousands of birds was evident from the reports that every investigator so far has made. The real extent of the inroad on the duck supply and the fact that the death toll appears to be increasing, has not been apparent to most sportsmen. That it is time to act and to make some effort to save a larger breeding stock of ducks has been made apparent by poor hunting conditions of recent years and has again drawn attention to the problem of the control of the devastating sickness which causes such great mortality.

In the *Saturday Evening Post* for February 19, 1927, Dr. E. W. Nelson, chief of the United States Biological Survey, reviews the whole situation and pictures the devastation around the alkali states of the west. The astonishing statement is made that losses in the Bear River marshes of Utah have run from 30,000 to more than 100,000 and that in worse years they have amounted to from one million to two million ducks in addition to numerous birds of other species, and that the total loss in the west since 1902 has probably reached 15,000,000 ducks.

Relative to western conditions he says:

The most imminent of all dangers now confronting our migratory wild fowl has developed in the states west of the Mississippi Valley. In this mainly arid region the water has disappeared from numberless lakes, ponds and marshes, covering thousands of square miles, through drainage, the diversion of water from streams for irrigation and a rapid evaporation, amounting to several feet a year in some areas, combined with a period of scanty rainfall extending over more than ten years.

These vanished water areas vary from small ponds and marshes to such large open waters as Goose Lake, lying across the border between Northeastern California and Oregon. Until within a few years this lake, about fifteen by forty miles in extent, covered an area of about 600 square miles, with its greatest depth about twenty-five feet. In October, 1926, its basin was a bed of alkaline dust, whirling up with the passing winds into stifling clouds. Tulare Lake, in the San Joaquin Valley of central California, once had more than 250 square miles of ideal wild-fowl marshes. Its bed is now dry and occupied by ranches. A little farther south, Buena Vista Lake, somewhat smaller but of similar character, also has gone dry.

In eastern Oregon a large number of lakes are known to have disappeared during the past few years. Malheur Lake,

a large federal bird refuge in this state, long famous for the superb bird life breeding in it, has gradually decreased, until in October, 1926, it had only about one-tenth the water area existing the previous year and was only one twenty-fifth its original size. With another dry year it may disappear completely.

There is reason to believe that with the return of rainy years many basins now dry may fill again. A remarkable indication of this was in the discovery, when Goose Lake went dry, of an old well-marked wagon road crossing its bed from east to west. It is reported that the bed of the lake is of hard clay, which held these ancient ruts firmly until they were filled with a finer siltlike material. Local tradition and old records tell that this lake bed was dry and wagon trains of gold seekers and other emigrants crossed it here from 1849 to 1853. Subsequent abundant rains must have filled the basin and maintained the lake until the recent dry period which has revealed what might be called a fossil wagon road about seventy-five years old.

A return of wet seasons cannot be expected to restore the former conditions completely, for this region is being increasingly occupied by man, and many permanent changes have taken and are taking place, affecting its surface waters.

The general decrease in water areas in the Far West has forced a great concentration of wild fowl in those still remaining. At the same time, through evaporation, a concentration of alkaline contents in very many of these areas has rendered the water poisonous to the birds drinking it. This, possibly aided by some yet undiscovered disease resulting from overcrowding, has brought on an appalling mortality, not only among all wild ducks but to a lesser extent among geese. In addition, it has caused a great death rate among all the species of sandpiper, snipe and other waders, and herons, gulls, blackbirds, and practically all birds that frequent marshes. This so-called duck disease occurs in varying intensity during the summer or fall months every year, causing heavy losses each season and every few years becoming especially virulent and producing a frightful devastation in the bird life.

SCIENTIFIC DATA SECURED BY LION HUNTER BRUCE.

Not only is state lion hunter Bruce performing great service to conservation by reducing the number of mountain lions, and thus improving the deer supply, but he is at the same time increasing scientific knowledge regarding this large predatory animal. For several years, he has been taking careful measurements of every animal killed making careful weights, and thus making it possible for those interested in accuracy to discount the usual stories regarding the ten and twelve foot length of a mountain lion. It has been found that a skin can be stretched very readily to give a length of nine or ten feet, but actual measurements of recently killed animals bring the actual average length to around seven feet. Furthermore, Mr. Bruce has fur-

nished the Museum of Vertebrate Zoology at the University of California with as fine a series of skins as is to be found anywhere in the world. As a consequence, the scientists will always have useful scientific material on which to base judgments as to the characteristics of this largest member of the cat family found in the west.

STORM DAMAGE.

The storms of February not only overflowed levees, inundated farms and caused thousands of dollars damage to agricultural interests, but it swept away and severely damaged various racks used by the Department of Fish Culture in trapping fish for spawning.

Beaver Creek also withstood the high waters with no loss of material.

The repair of the racks and traps will take \$4,000. The damage will hamper spawning operations and probably reduce the take of eggs for the season.

AN INDIAN BRUSH DAM FOR THE TAKING OF FISH.

The accompanying photograph is of a dam built by the Pomo Indians of Potter Valley across the main Eel River. This dam is built entirely of brush across a riffle. On the side where the fish are taken a portion extends up stream some few feet forming a sort of pocket, the bottom of which is covered with white rocks so that a fish swimming over them



FIG. 28. Indian brush dam in Potter Valley. Typical of the old Indian method of securing winter food supply and also typical of an illegal method at the present time. Photograph by J. H. Hellard.

At Shackleford Creek, Hornbrook, Bogus Creek, Camp Creek and other places contiguous to Mount Shasta Hatchery, a great deal of damage was caused by the heavy rains. At Hornbrook Station the cabin and personal effects of the man in charge were washed away. On the Klamath the water is said to have been higher than at any time since 1889-90. While the man at Shackleford Creek was reporting conditions over long distance phone to Captain G. H. Lambson, superintendent at Mount Shasta Hatchery, the waters carried away all bridges and he was forced to take a horse on his return trip. Fall Creek suffered little, although the water ran over the tanks.

is easily seen. A platform of logs is then built over the water to stand on and a stake driven into the ground on which is fastened a light. Usually this light is a pine torch in a wire basket or "torch jack."

In years past the Indians would take their families, go out to the river, build a dam, stay by it for several days and catch large numbers of steelhead when they were running in the spring. This particular dam was across the river about two weeks before it was discovered. There has not been one like it built for several years as the practice is becoming obsolete. The construction was so good that no fish of any kind could get through and the

dams would remain until a freshet washed them out or some one removed them.—John H. Hellard.

THE VALUE OF WILD FOWL.

Mr. Manly S. Harris in an address to a group called to organize the United Duck Hunters of California held at the Clift Hotel, San Francisco, on January 6, 1927, emphasized the money value of ducks in the following words:

The monetary importance of duck shooting and all sports in California is many millions, in fact, every piece of property in California is more valuable with our streams, marshes and forests well stocked with fish and game, and every piece of property is worth less without it. Every year California is becoming more and more the winter resort of the American continent and every day more people of the east are carrying on with the hope of some day being able to live in our golden winter sunshine. Not the least of our attractions is, and should be, the open country, the field, forest, stream and marsh land. Most important of these, I believe, is the marsh. Here is our winter sport. It admits of definite location and action in preserve form and its open season is when the man of independent means is here on a holiday. Where is there one, who is man enough to gain a fortune, who is not red-blooded enough to want to go afield with gun in hand? You will be surprised to know that the capital invested in duck clubs north of the Tehachapi is estimated to be more than \$21,000,000—a very important industry. You will be surprised to learn, also, that eighteen carloads of shells from eastern manufacturers, worth \$1,800,000, were used in California last year, besides those manufactured here. Then, too, California sold 250,000 hunting licenses last year at \$1 each. Now, allowing that every licensee owned only one gun, one that cost \$50, would mean \$12,000,000 invested in guns. Allowing that every licensee pays for boots, clothes, duck traps, raincoats, etc., \$25 a season, which is a very low estimate, would mean \$6,000,000 more. Automobile tires, gasoline, and railroad fares, we will leave out of account. Yet it is a tidy business, this duck shooting.

DEER INCREASING IN STANISLAUS FOREST.

When sportsmen read of the large number of deer killed in the Stanislaus National Forest in the successful effort to control the foot and mouth disease, it left little hope that many deer remained after the control measures were finished. It is good news, therefore, to get first hand information from Deputy Longeway and others that deer are being seen in

increasing numbers within the area where so many deer were killed. Last season 150 unusually large bucks were secured, and it is the opinion of observers that there will be a quick replacement of the deer killed, "provided the hunters' toll is not too heavy."

CLASSIFICATION OF VERMIN.

The report of a committee on "Classification of Vermin," was made by Dr. A. K. Fisher, chairman, at the Thirteenth National Game Conference. The report merely announced the general principles which should govern in deciding as to whether any species is more destructive than beneficial. The committee declared that it was impractical to make any "list" of destructive species that could be used for the country as a whole, as many factors of environment must be taken into consideration. Careful investigation must be made in each locality to determine the food habits of mammals and birds in that place to determine the ones that are injurious to game or other useful species. The problem therefore becomes a local one to be studied accordingly. Game farms and fish hatcheries are magnets which attract raptorial birds, destructive mammals and other species and at such places the list of injurious ones is much larger than in the open country where the food habits of some of the same species may be beneficial.—*American Game*, Vol. 16, No. 1, p. 9.

SURVEY OF DUCK CONDITIONS PLANNED.

Dr. E. W. Nelson, chief of the United States Biological Survey, has for some time been calling attention to the need for better conservation of wild fowl and to the need for enlargement of marsh areas attractive to waterfowl. At his suggestion, California sportsmen have undertaken to raise a fund of \$10,000 for the purpose of making engineer's surveys and estimates of cost for the reflooding and reconditioning of three marsh areas in the west: Lower Klamath Lake in northeastern California; Malheur Lake in Oregon, and the Bear River marshes on the great Salt Lake, Utah. Interest in this method of solving the difficult problem which now confronts the duck hunter in the west is increased because of the possibility of securing appropriations to handle these improvements if plans and cost estimates could be furnished Congress. When the situation is reviewed, a number of possibilities are apparent.

Lower Klamath Lake can be largely reflooded and the agriculture areas at the north end safe-guarded. Conditions at Malheur Lake could be improved by a series of artesian wells to furnish fresh water. The Bear River marshes can be improved by diking and thus restricting the flow of fresh water.

Earnestly setting themselves to the task, California sportsmen have designated state quotas for the eleven western states, and themselves are assuming one half of the entire amount. Remittances should be marked for "Western Duck Fund" and all of the moneys received are being deposited to the credit of the United States Department of Agriculture with the understanding that the funds will be used only for the survey plan.

WORSE THAN A CRIME—A MISTAKE.

Many of the mistakes of this generation may seem in their tragic consequences little less than criminal in the eyes of generations to come. Some mistakes permit of no remedy—the damage is irrecoverable.

As custodians of wild life our mistakes have been many. For in this complex world of ours, with its myriad unknown and interdependent forces, only omniscience can foresee the far-reaching effects of man's interference. At some expense we have learned caution in tampering with the delicate balance of our social structure. But we have not yet learned the need for the same caution when dealing with nature's balance in the world of the out-of-doors. Already here and there man has destroyed this balance utterly. He has over large areas profoundly modified it. But back in the hinterland of forest, field and woods a balance still exists that is well worth preserving.

Henry R. Carey pleads for maintaining this balance; for the necessity of withholding a destructive hand toward any kind of wild life until we know what the result of man's interference may be. It is a word of caution well taken. There is an insidious facility in recommending campaigns of extermination. Hawks have been found destructive to poultry? Destroy all hawks! Mountain lions kill live stock? Exterminate all mountain lions!

Nothing, apparently, could be simpler and yet nothing in the long run could probably be more inimical to our wild life.

"Not having omniscience," says Mr. Carey, "man can not experiment with

living creatures as he can with chemicals in a test tube. If the chemistry experiment fails, more materials are at hand for a fresh attempt. But if the venture with a race is wiped out, all the test tubes in the world will not replace the complicated organism, itself a balance of nature's forces which was the work of ages of slow growth.

"Let us beware of flattering ourselves into a belief that because we have begun to understand and control electricity we can successfully guide the destinies of the living creatures of the world. That may come in the distant future but certainly not until we know much more about the nature of life itself."

So we may well pause amid these clamors of "Get rid of this—exterminate that" and confine ourselves to measures of local control until we learn a little more. Today we do not know enough to undertake safely any experiment of extermination, for many of the apparent villains in the wild life drama may yet have their necessary parts in nature's eternal economy. In terms of human happiness and human welfare the importance of our wild life increases as the years pass. We who today enjoy our brief loan of life on earth are not earth's last generation. Ours is a strict obligation, for in Mr. Carey's words, "We hold the wild life only in trust."—*American Forests and Forest Life*, Vol. 32, No. 394, p. 616.

A COMPARISON OF GAME CONDITIONS.

A comparison not odious but productive of thought can be made by comparing Pennsylvania and its game conditions with those in California. Pennsylvania issues more than a half million of resident hunting licenses, which is more than double the number issued in California. The legal kill of deer amounts to about one-fourth of that of California in spite of the greatly reduced amount of deer territory in Pennsylvania. Many sections now boast more deer than when white settlers first came. Estimates of the actual take of small game, such as rabbit and squirrel shows a healthy increase in average number of hunters in spite of an increasing number of licenses. This eastern state still includes wild turkeys in its list of game birds, but sportsmen are generally of the opinion that wild turkeys should be given actual protection for at least one year. During the open season of 1925, 470 black bears were killed in the state. There is no estimate of the kill of bears in California, so no com-

parison here is possible. That Pennsylvania is not a waterfowl state is evidenced by the estimate of 56,968 as being killed during the season of 1925.

A UNIFORMED PATROL FORCE.

Adoption of a "service suit" for all employees of the California Fish and Game Commission was one of the features of the second annual convention of that body. The "suit" is to be of light gray whipcord cloth, similar in style and cut to that worn by forest services and similar agencies.

The wearing of the service suit is to be voluntary, as there are many times in the field when the identity of men must be kept secret.

Men of the southern California patrol district are already in uniform, having adopted the service suit several months ago.

The principal arguments in favor of adoption of the suit were:

1. Increased respect for fish and game laws when enforced by a uniformed body.
2. Educational value of a uniformed force and elimination of complaints of lax vigilance on part of the wardens from persons unacquainted with them.
3. Giving the public the identity of these men to whom they may report violations of the law.
4. Elimination of the danger to deputies in civilian clothing when they are forced to stop autos on the highway for the purposes of inspection.

OPOSSUM DEPREDACTIONS INCREASING.

Judging by newspaper reports the Virginia opossum, which was accidentally introduced into the state, is causing considerable trouble in poultry yards and rabbit hutches. A recent report is to the effect that one poultry rancher was losing his chickens regularly each night and thought that some human thief was responsible. When policemen were sent to watch the place, a fat opossum was apprehended making off with a large hen. Since the opossum appears to prefer willows and underbrush along streams, depredations are most frequent in such vicinities.

While noting depredations to domestic stock, attention may well be called to the danger to wild birds and animals. The opossum is omnivorous, frequently depending upon fruit in season and yet pleased when birds or animals are available. Exactly how this interloper is going to affect our native fauna is yet to be determined, but certainly a watch

should be set to determine depredations of this sort. The opossum is so prolific and has such a wide distribution in California that it is now too late to exterminate this dangerous species and resort will have to be made to methods of control.

THE REAL ENEMY.

No sportsman should overlook a chance to drive a nail in the coffin of pollution. Today this evil kills more game fish than are taken by all the sportsmen in all the states.

There is no possible reason why a factory or manufacturing plant of any description should turn its refuse into a public stream. No city or municipality has the slightest excuse to pollute and vilify public waters by filling them with municipal wastes. Most states have laws forbidding it, but still the practice goes on, for the penalties are usually not extreme and the influence working against a conviction is always strong.

Public sentiment can remedy both of these stumbling blocks.

An instance was called to our attention last summer of a stream near New York City in which the fishing had been very poor. The sportsmen felt that it would be necessary to stock it heavily to restore the sport of former years. It was common talk that it was fished out.

And then one day a dye plant turned some poisonous chemicals into this stream. Dead trout from fingerlings to battle-scarred warriors strewed the banks in countless numbers for miles. It was unbelievable that a stream that had furnished such poor fishing could contain such enormous quantities of brook trout.

A conviction was secured, although the manufacturing plant fought the case bitterly, insisting that the chemicals had been put into the stream through the error of a workman and against the strict orders of the management. A nominal fine was paid and the state is again stocking the stream in an effort to bring it back to its former productiveness. But it will be many years before fish can grow to real fighting size.

Damage of this nature is not confined to streams. Men interested in bathing last year put chemicals in a good bass lake not far from the stream mentioned above in an effort to kill the vegetation which was a nuisance on the bathing beach. The result was satisfactory so far as destroying the aquatic plants was concerned, but bass and other fish inhabiting these waters were also killed, and the banks strewn with dead fish.

Similar cases can be cited throughout the country; and unless more vigorous opposition is raised, thoughtless employees and corporations that are totally indifferent will continue to destroy fish wholesale.—*Field and Stream*, June 1926, p. 21.

THE RELATION OF FORESTS AND FORESTRY TO HUMAN WELFARE.

Forests are more than trees. They are rather land areas on which are associated various forms of plant and animal life. The forester must deal with all. Wild life is as essentially and legitimately a part of his care as are water, wood and forage. Forest administration should be planned with a view to realizing all possible benefits from the land areas handled. It should take account of their indirect value for recreation and health as well as their value for the production of salable material; and of their value for the production of meat, hides and furs of all kinds as well as for the production of wood and the protection of water supplies.

Unquestionably the working out of a program of wild life protection which will give due weight to all the interests affected is a delicate task. It is impossible to harmonize the difference between the economic, the aesthetic, the sporting and the commercial viewpoint. Nevertheless, the practical difficulties are not so great as they appear on the surface.—Henry S. Graves, former Chief Forester, U. S. Forest Service, *Recreation*, Vol. LII, p. 236, 1915.

MOUNT TAMALPAIS REFUGE.

To any thoughtful person it is quite apparent that the game refuge may sometimes be a refuge on paper. Whether it fulfills the purpose for which it is set aside depends upon several things.

First and foremost, it must furnish a suitable feeding and breeding place for birds or animals which it was designed to conserve. Second, it must have sufficient patrol to provide safety from poachers.

According to Deputy W. B. Sellmer, the Tamalpais Refuge which was created in 1917 is a real sanctuary for game. Deer, estimated at thousands, find safety within its boundaries. The best evidence of its efficiency is to be found in the fact that there has been a continuous increase in kill of deer along the edges of the refuge. About 400 deer were killed in neighboring territory during the 1926 season, and nearly 100 more at other places in Marin County. It is also reported that deer have actually been seen to take refuge within the boundaries when pursued during the hunting season.

Although there has been some complaint by the hunters that Richardson Bay, which was included in the Mount Tamalpais Refuge as a sanctuary for water fowl, has taken away too much available hunting ground, yet most people are pleased with the result. Commuters, riding back and forth to Mill Valley and other Marin County points, who take pride in seeing thousands of rafted ducks in the bay, are more numerous than the hunters who formerly used the area as a hunting ground. Therefore, from the standpoint of the number utilizing the birds the present situation is desirable.

RABBIT BOUNTY FAILS IN KANSAS.

It would be interesting to see a compilation of the instances in which bounties on various animals have failed to bring about the results expected and have, in many instances, depleted treasuries. Two outstanding examples which come to mind are the hawk bounties offered in Pennsylvania and the coyote bounty, which depleted the state treasury of California to such an extent that when the law was repealed, the state still owed \$50,000 on the scalps of coyotes presented for bounty. A recent newspaper item states that the superior court in Kansas has ruled that western Kansas counties need not pay a five-cent bounty on the jack-rabbit. The five-cent bounty has made serious inroads on the slim treasuries of sparsely populated Kansas counties and they refuse to longer pay the bounty. The superior court has ruled that bounties need not be paid when the general fund is insufficient. Here then is yet one more instance of the failure of such bounty laws. There still remains the recording of the failure of such a system to really accomplish the results in rabbit control claimed by its adherents.

CALIFORNIA QUAIL IN NEW ZEALAND.

In Canterbury, New Zealand, the California quail was introduced some thirty or forty years ago. It thrives well in those parts of the district where there is suitable food and where the rainfall does not exceed twenty-seven inches per year.—Edgar F. Stead, Christchurch, New Zealand.

DUCK DRIVES.

Duck drives on Sweetwater Lake in San Diego County are a fairly common thing. The net results, however, are not as desirable from the standpoint of toll taken as might be expected from the method used. A drive last fall which included thirty-eight boats netted at the

end, six ducks. As the flotilla of boats moves from one end of the lake to the other, the ducks get up, circle a few times and alight at the end of the lake which has just been left by the boatmen.

STRIPED BASS IN MARYLAND.

The striped bass number of CALIFORNIA FISH AND GAME apparently stirred the Maryland state game warden to discuss the striped bass situation in his own state. In the *Maryland Conservationist* (Volume 3, pp. 20-21) an article entitled "The Striped Bass of the Atlantic Coast" describes the successful introduction of this fish into California and gives the following interesting facts regarding the fish along the Atlantic coast.

"The striped bass does not cover great distances, or spend much of its life in the ocean. In Chesapeake Bay in Maryland it is our main food fish during 12 months of the year. When following streams in pursuit of spawning grounds, it is caught not only in salt or brackish water but also taken in fresh water at the heads of rivers. It is believed that in the late fall and winter the young fish, which have hatched out during the spring and summer, and which have reached a length of from three to five inches, abandon the shoal waters and seek the deeper water of the channels, and thence pass out into the ocean, where they start up and down the coast. The largest catches in Maryland waters are during the summer and early fall. After the cold weather sets in, the fish pass on to deeper water where they remain during the winter months.

The laws which are found on the statute books of the Atlantic Coast States are probably responsible for the striped bass being as plentiful as it is today, but the supply could be vastly increased by suitable protective measures. Speaking for Maryland, our laws are entirely inadequate. The spawning season being from April to July, it can be seen that the Maryland law, which provides that no striped bass weighing over 20 pounds may be taken during May and June, does not take care of the situation. No rock weighing over 15 pounds should be taken at any time of the year, as this size fish is one producing the spawn. Our laws further provide that no person shall take any striped bass under ten inches. The minimum size should certainly be increased to 18 inches.

The majority of striped bass taken on the Atlantic coast are by means of nets, which should be regulated by law, and during the spawning season, the fishermen should be compelled to raise their nets at least one-fourth of the period, thereby permitting the fish to reach their spawning grounds unmolested. The law should also provide that no net be fished during the spawning season with a mesh less than five inches. This regulation would also help the shad. The minimum and maximum sizes suggested should apply to the angler as well as to the commercial fishermen.

During the summer season of 1926, Maryland anglers have had excellent sport with striped bass, and fish ranging from

one to 11 pounds have been taken by rod, hook and line. Most of the fish, known as the Huntington drone by trolling. The angler either by the use of a hand line or a salt water reel allows the drone to trail at a distance, and the deeper the water the more weight is used as a sinker. The Huntington drone is in the shape of a shoehorn, with a hook soldered to same. It is used without bait and is said to be very effective."

MIGRATORY WILD FOWL IN MEXICO.

Many conservationists and others have been urging the negotiation of treaties with Latin American countries for the protection of species of birds that winter south of the United States, similar to the migratory-bird treaty with Great Britain, which covers the protection of birds that migrate between the United States and Canada. In order to gather information on which diplomatic representations might be based, a biologist was sent to Mexico in January where he spent more than two months studying conditions on the principal wintering grounds of migratory waterfowl. It was learned that migratory game birds, especially ducks, spend the colder months in great numbers in the principal lakes and marshes as far south as the valley of Mexico, and that they are in urgent need of better protection, as they are decreasing in that section because of the slaughter for market that has been carried on with little restriction for many years. Mexican diplomatic and game officials have shown a desire to cooperate with the United States in game protection, and the matter is to be given further consideration.—Annual Report, Chief of Bureau of Biological Survey, 1926.

EASTERN BROOK TROUT PLANTED IN MORAINÉ LAKE, TULARE COUNTY.

Moraine Lake, as the name implies, lies between two lateral moraines in a beautiful setting of lodgepole pine and red fir, with the snowcapped Kaweahs in the distance. It is a shallow lake with neither inlet nor outlet. Its sandy beaches and warm water, for a lake of 9400 feet elevation, have made it a favorite camping place for parties who care to swim.

Several plants of trout taken from Chagoopa creek have been made, but, lacking a spawning ground, they have not increased and were soon caught out.

The demand of the angler was for a fish that would spawn in a land-locked lake and as the eastern brook seemed to be the fish best suited, a shipment was asked for,

On June 29, 1923, I received a shipment of eastern brook trout at Porterville, California. They were taken by auto to Camp Nelson, a distance of 35 miles. The cans were placed in the creek to change the water and rest the fish. At 1 p. m. they were loaded onto a pack mule and started for their future home.

Water was changed in the cans two miles out of camp. As the afternoon was hot on the summit, five miles from camp, a large bucket of snow was added to each can. The next stop was made at Little Kern, 16 miles from camp, where the water was again changed. At Trout Meadow the cans were placed in the creek for the night. This first lap of the trip was made in about six hours with the loss of only a few fish.

The following morning I left Trout Meadow at 5 o'clock, changed the water frequently, and arrived at Funston Camp on the Big Kern at 11 o'clock, where the cans were again placed in the river and allowed to rest until 5 o'clock the following morning. From here they were taken up onto the plateau to Moraine Lake, arriving at 8 o'clock and after tempering the water in the cans to even the temperature, as the water in Moraine Lake is warmer than river water, the fish were turned loose.

Only about fifty fish were lost on the entire trip from Porterville to the lake, a distance of about 80 miles, 45 of which was made with pack animal.

These fish seemed to adapt themselves very rapidly to their new home and with an abundance of food, they grew very rapidly.

On July 26, 1924, two fish were taken that measured eleven inches, and many other fish were seen.

On June 19, 1925, these fish had grown to 14 and 15 inches and showed evidence of spawning in the fall.

On July of this year I returned to the lake and was delighted to see several young fish about three inches long.

Although there were not as many fry as I had hoped to find I think that this fall's spawn will be heavier and stronger.

I hope the four remaining rainbow trout will be taken this summer, as this will eliminate the danger of their destroying the egg beds of the brook trout.

The adult brook trout now measure 16 inches and weigh over a pound, three years after the plant.—O. P. Brownlow, Porterville, California.

REINDEER INDUSTRY PROMISES TO BE IMPORTANT TO ALASKA.

The reindeer industry in Alaska promises to become an important factor in

the future development of the territory, says the Biological Survey of the United States Department of Agriculture. It is comparatively a recent undertaking and as a commercial enterprise dates back only a few years. The original stock of 1280 animals imported from Siberia about 25 years ago has increased to about 350,000, distributed throughout the territory in 110 herds.

The rapidly growing industry requires that scientific studies be made for its best development, and under congressional authorization such studies were begun by the department in 1920 through the Biological Survey. Improved methods have been recommended to herd owners for handling reindeer and utilizing the range. A study of the range is now being made with a view to inaugurating a permanent system of grazing allotments. Careful and continuous inspection will be required to determine whether an area is being under or overgrazed.

One of the more fundamental of the problems studied has to do with the relation of lichens to grazing. Plans for future work contemplate studies chiefly along such lines as the development of interior ranges, conditions governing forage and range management, breed improvement of reindeer, and the control of the diseases and parasites to which the animals are subject. In view of the fact that conditions in Alaska are so different from those in the states as regards the kind of animal under consideration, the nature of the forage, and the climate, it is particularly important that thorough studies be made.

Full progress in the reindeer industry can come only from the adoption of better management methods, not only in range control and regulation, but in herd management and provisions for transporting and marketing the meat. This involves open herding, reduction of the proportion of bulls in the herds, selection of the best stock for breeding, infusion of new blood by cross-breeding with native caribou, adoption of improved methods of corralling and branding, keeping sled reindeer in each herd, and providing for herd ownership on the percentage basis for increases, with one registered brand for a community herd.

HEAVY WILD FOWL LOSSES RESULT OF REDUCED WATER AREAS.

Reduction in water areas in states west of the Mississippi is causing tremendous mortality among wild fowl, Dr. E. W. Nelson, chief of the United States Biological Survey said today (December 7) in an address before the National

Game Conference of the American Game Protective Association in the Hotel Pennsylvania, New York. There is crowding of birds in the remaining lakes and marshes, the water of which through evaporation and concentration of alkaline contents seems to become poisonous to the wild fowl, Doctor Nelson explained. He declared the marshes that are drying up could be flooded at moderate expense, and thus converted from death traps into healthy resorts for birds.

"The general symptoms of 'duck-sickness' are successive paralysis of the wings, legs, and necks of the birds, and the gradual development of a more or less comatose condition, followed by death. The development of these stages requires a period of several days. After the birds become helpless they may be gathered in great numbers, and when placed in an inclosure with fresh water nearly all recover in a few days and are able to fly away apparently entirely cured.

"Mr. D. H. Madsen, State Fish and Game Commissioner of Utah, estimates that in years when this 'sickness' is least prevalent in the Bear River marshes the losses there run from 30,000 up to more than 100,000, while during the worst years they amount to between one and two million ducks, in addition to numberless birds of other species. The number of ducks which have perished from this sickness in Utah, since 1902, and mainly within the last 15 years, probably exceeds 10,000,000, and with the toll taken by this or allied causes elsewhere in the west, makes a total loss exceeding 15,000,000 ducks, and probably an equal loss has been suffered by other birds.

"Mr. F. C. Lincoln, of the Biological Survey, who spent several weeks banding wild fowl in the Utah marshes during the summer of 1926, had an opportunity to make interesting observations concerning the 'duck-sickness.' On June 29 in passing through a narrow channel on the grounds of the new State Gun Club near the mouth of the Jordan River, he saw at least 300 dead ducks. He gathered 50 helpless ducks and after banding them transferred them to an inclosure with fresh water. Of this number 26 were pintails, 11 green-winged teals, 5 mallards, 4 cinnamon teals, 2 spoonbills, 1 gadwall, and 1 redhead. Near Duckville, on the Bear River marshes he found conditions vastly worse owing to the greater area involved.

"There one day he found 22 dead Canada geese, and captured four others which were helpless, but saved them by

placing them in an inclosure with fresh water. In addition to vast numbers of ducks he found dead California gulls, great blue and snowy herons, avocets, black-necked stilts, sandpipers, Wilson phalaropes, glossy ibises, coots and yellow-headed blackbirds. In one area not over five feet square he counted eight recently dead ducks, and reports that the stench on this marsh from the decaying bodies of the ducks was almost overpowering. Owing to the vegetation on the marshes he could see only a limited number of the dead ducks and is confident that at that time tens of thousands of birds had already perished there, although his observations were made only at the beginning of the season and the most serious losses came later.

"Perfectly practicable ways are available to relieve the situation on a great scale. A visit to the Bear River marshes in October revealed to me the most gratifying fact that a very considerable quantity of fresh water is being discharged by Bear River through the marshes into Salt Lake and that by building dikes from 15 to 18 miles in length this can be held back to flood about 150 square miles of marsh. This will convert this area from a terrible death trap to bird life into a wonderful feeding and breeding ground for innumerable wild fowl. The Bear River Hunting Club has already diked and flooded about 8,000 acres of marsh lands in this district, and great numbers of waterfowl are rearing their young there each year. With these marshes converted into a healthy resort for the birds instead of becoming a ghastly death trap for them it would add tens of thousands of birds bred there each year to the supply and would give a resting and feeding ground for myriads of birds on their migrations north and south. The cost of this project would be about \$300,000. Similar work is possible in other areas.

"In spite of the fact that the ducks of the states west of the 100th meridian have been greatly decreased through the terrible losses previously described, yet plenty of birds survive to bring back their numbers whenever the conditions are so changed that the birds will not be annually destroyed."

PAUL G. REDINGTON IS NAMED CHIEF OF BIOLOGICAL SURVEY.

Paul G. Redington, Assistant Chief of the Forest Service, in charge of the Branch of Public Relations, has been named by Secretary of Agriculture Jardine as Chief of the Bureau of Biological

Survey to succeed Dr. E. W. Nelson. The appointment will become effective May 9, according to the announcement made today.

Doctor Nelson has been associated with the work of the Department of Agriculture since 1890, and has been Chief of the Bureau of Biological Survey since 1916. During more than 50 years spent in the study of wild birds and animals he has accumulated a vast knowledge and experience. In order that he might devote his entire time to the assembling of information he has gathered and to round out his work in the field of science, he asked Secretary Jardine to relieve him of the executive responsibilities as chief of the bureau.

Before he began devoting his entire time to administrative work in the department Doctor Nelson spent more than twenty years as a scientific explorer in different parts of the continent from the Arctic to the Tropics. From the collection of birds and mammals obtained at this time he and others have described hundreds of species previously unknown to science. As a part of his Arctic experiences he was a member of the "Jeanette" search expedition in 1881 and was with the first party to land on Wrangell Island. His work on the customs and history of the Eskimos, made as a result of his study of these people while in Alaska in the 70s, is still an authoritative publication. In Mexico his travels during fourteen years extended into every state and territory of that country and resulted in securing large collections of specimens of mammals, birds, reptiles, and plants and in the accumulation of a vast amount of data, which he now expects to find time to prepare for publication.

His published work includes monographs of mammals and birds and descriptions of many new species. He is also the author of popular books and articles dealing with various phases of wild life and wild-life conservation.

During the ten years he has served as Chief of Biological Survey the bureau has developed and it is now generally recognized throughout the world as one of the leaders in the study of wild life and its conservation.

"Doctor Nelson has performed a valuable service to science and has made an enviable contribution to our knowledge of wild life," said Secretary Jardine in announcing this change in personnel. "In connection with one of Doctor Nelson's books on the 'Wild Animals of North America,' Theodore Roosevelt once said that the author was 'one of the keenest naturalists we have ever had and a man

of singularly balanced development.' In recognition of his scientific work, both in the field and in the laboratory, a large number of species of various animals and plants have been named in honor of Doctor Nelson. It seems only proper that he should be relieved of the responsibility of administrative duties in order that he may turn his entire attention to bringing together the results of his experience and give more of his time to research studies. He will remain in the Bureau of Biological Survey as Senior Biologist."

"Mr. Redington has been connected with the Forest Service since 1904, and the lines of work on which he has been engaged both in Washington and in the field have been such as to well fit him for the various activities of the Biological Survey," said Secretary Jardine. "These activities include the conservation of the useful game and fur-bearing animals, game and insectivorous birds, and other beneficial or harmless forms of wild life and the control of those forms that are found to be injurious to agriculture, stock raising, horticulture, and forestry.

"Under the Biological Survey also are 72 bird and game reservations, and Mr. Redington's experience with wild life administration on national forests will be an asset both to him and to the Biological Survey in his new field of public service. Throughout his service over nearly the entire United States he has taken an active personal interest in wild life and its conservation. He has acquired his familiarity with our game birds and animals through his numerous contacts in outdoor life."

Mr. Redington has served the Forest Service in many western and southwestern states and in the headquarters at Washington. Following his appointment in 1904 he was assigned to work in Montana, Wyoming, and Idaho. Appointed forest inspector in 1906, he inspected timber sale work in Wyoming, Colorado, and Utah. In 1907 he was advanced to the position of inspector, and the following year was transferred to Colorado as associate district forester. From 1911 to 1916 he was supervisor of the Sierra National Forest in California, and from this position was promoted to district forester of the Southwestern District, with headquarters in New Mexico. Before returning to forestry work in California in 1919 he was city manager of Albuquerque for a term. For the next five years, as district forester of the California District, he administered the eighteen national forests of that State, and one year ago was promoted to assistant forester, with headquarters at Washington,

Mr. Redington is a native of Illinois. He was graduated from Dartmouth College in 1900, and during the years 1902 to 1904 took a post-graduate course in the Forestry School at Yale University, receiving the degree of Master of Forestry.

Mr. Redington will be assigned to the staff of the Biological Survey on February 16, spending the time prior to May 9 in becoming more familiar with the details of the bureau's work.

1926 FIRE RECORD FOR NATIONAL FORESTS OF CALIFORNIA.

A total of 1662 fires which burned over 584,601 acres and cost \$565,136 to suppress is, in brief, the 1926 fire record for the national forests of California, according to figures released by S. B. Show, chief of the California district, United States forest service.

Of the total of 1662 fires that occurred in and adjacent to the federal forests, 1138 or 68 per cent were due to human carelessness—as compared with 537 out of a total of 1915 fires in 1925. Smokers led the list with 427 fires, with incendiaries 178, railroads 170, campers 137, lumbering operations 52, brush burners 50, and miscellaneous causes 124. Lightning is credited with starting 524 fires.

The total area of government timber and brush land burned over was 215,508 acres, while 369,094 acres of private lands within and adjacent to the national forests were swept by flames. The total cost to the forest service of fire suppression was \$565,136, or more than double the expenditures made for like purposes in 1925.

Fires in the national forests this year killed 296,000,000 feet of federal owned timber besides large amounts of young growth, destroyed 750,000 feet of cut logs, and occasioned damage to logging equipment, mills and improvements amounting to \$216,000—making a total loss, based on conservative estimates, amounting to nearly one million dollars, of which more than three-quarters of a million dollars were timber losses. Figures on additional losses of forage, wild life, water conservation and recreational resources are not available.

The leading fire forests were:

Shasta _329 fires, 85,542 acres burned
Plumas _181 fires, 30,988 acres burned
Klamath _161 fires, 111,412 acres burned
Sequoia _122 fires, 104,262 acres burned

The Angeles, Santa Barbara, San Bernardino and Cleveland national forests of southern California, long noted as the "tinder boxes" of the state, had

only 147 fires that covered a total of 41,384 acres—an area less than that swept by the great San Gabriel fire of 1924, in the Angeles forest.

Smoking was prohibited on all national forests in southern California throughout the fire season, and, backed by similar ordinances in some counties, was rigidly enforced, with the result that of the 427 smokers' fires that occurred in the government forests of the state, only forty-six occurred in the southland. On the San Bernardino forest alone there were 108 convictions for violation of the smoking regulations, and the fines assessed totaled \$2144. The no-smoking regulation was later extended to the northern forests until on September 1, over 15,000,000 acres of national forests in California were closed to smoking.

With the opening of the statewide hunting season on September 1, a large force of special registration guards was placed on the main roads leading into all national forests, and everyone entering the forests was required to register and was warned to be careful with fire. On the Modoc forest every automobile was required to be equipped with an ax and shovel, and on the Shasta forest every man in a hunting or camping party was required to provide himself with these fire fighting implements. The sportsmen's clubs of California gave able assistance to the forest service in the carrying out of registration and no-smoking orders by raising money for the hiring of guards.

By and large, the 1926 fire season on the national forests was a strenuous one and almost equal in intensity to the disastrous year of 1924. Because of the prolonged dry season, low humidity and hot winds, fires started easily and made spectacular runs. The Deetz fire on the Shasta forest, on cut-over land, ran 2000 acres the first afternoon, was controlled, but broke out again and ran 3000 acres the second day. On the Plumas forest, the Little Last Chance fire, in virgin timber and young reproduction, swept over 25,000 acres in three days. Many fires outside the national forests attained sizes of from 10,000 to 75,000 acres.

But, the forest service says, this is only half of the fire story—the state forester has yet to report fire losses in California outside the federal forests, and when these figures are made public the combined losses of forest resources should be such as to awaken every citizen to the tremendous seriousness of the yearly fire problem of the state.

FOREST CONSERVATION A
NATIONAL OPPORTUNITY.

As long as conservation is a dominant factor in the perpetuation of the country's forests, the people of the United States must accept forestry as an opportunity as well as a responsibility, said E. A. Sherman, associate forester of the United States Forest Service, Washington, D. C., at a recent meeting of the American Forestry Association.

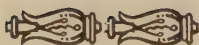
The fact that the dark side of forestry has been overdrawn, Mr. Sherman asserts, is largely the result of the magnitude of the task involved in the conservation and restoration of our forests. The evidence of the economic disaster confronting our nation has made forestry somewhat of a bugbear, notwithstanding the fact that the intelligent people of the United States now thoroughly understand and deplore the fact that 81,000,000 acres of forest land are idle, and that the United States is consuming each year four times as much timber as it grows.

"For long years past," declares the associate forester, "we have bewailed our wasted forests, our idle acres, our silent mills and abandoned towns, the rapid diminution of our remaining forest resources, the blindness and stupidity of our national carelessness with fire. We

have preached the curse of wasted resources, blackened stumps, barren lands and economic damnation generally; but I want to urge that henceforth we preach the blessing of new and better forests, industries restored upon a permanent basis, and the landscape beautiful arising from the ashes of the landscape desolated.

"We must sell to our people the idea that beauty as well as the utility of our forests has a real value measurable in dollars and cents in that it makes the country more attractive for the habitation of man and adds materially to the sale value of every acre of land within the radius of its influence.

"Instead of bewailing the fact that it costs money to protect forests and plant new trees, and that all this expense might have been avoided, why not emphasize the fact that by expenditure of only a relatively small amount of money we can have cheaper and better homes, finer streams, better fishing and hunting, a more attractive landscape; and that by so providing forehandedly for the future we have demonstrated that as a nation we are self-supporting and permanent, and do not owe our commercial supremacy simply to the fortunate circumstance of rich resources accidentally inherited."



FACTS OF CURRENT INTEREST.

Although San Diego County is not considered an area to support many deer, yet a check of the deer killed the past season showed 136.



The crisis in fish and game administration hinging upon the success or failure to secure adequate funds for conservation work in California has occupied the interest of all lovers of the open from law makers down to humble hunters and fishermen.



At the January session of the State Legislature, 115 bills were introduced which were referred to the fish and game committees. To separate the good ones from the bad will take intensive study and keen insight.



During February the reports came in of deer dying in Mendocino and Humboldt counties from some mysterious disease. The Commission immediately dispatched a man to investigate.



Recent court decisions have checked the operation of floating reduction plants bent on turning food fish into fertilizer without limit or regulation.



Water poured over the top of the racks at the Klamathon Salmon Egg-collecting Station to a depth of four feet during the January storms. Fortunately the spawning season was over and losses were small. However, storms late in the spring caused \$4000 worth of damage at various egg-collecting stations.



Following a decision made at the annual convention of employees the deputies will at their discretion wear a service suit of gray whipcord. The southern patrol has already appeared in uniform with very satisfactory results.

COMMISSION ACTIVITIES.

Department of Patrol.

Repeated search of markets in San Francisco during the duck season and the notably high price offered by duck bootleggers showed that deputies are curbing the work of market hunters and that fewer ducks are reaching the markets for illicit sale. Three market hunters apprehended at Stockton with 200 ducks were fined \$450. The larger fines now accorded the violators are having a salutary effect.

During the month of December, 99 cases were taken into court, a small number compared with other months, and total fines of \$3,495 imposed. Three men having in possession two pheasants were accorded a fine of \$100 each by Judge Murdock. A dollar-a-year deputy arrested a shipyard worker in Oakland for dynamiting fish and the court assessed a fine of \$200. An ahead-of-time duck shooter, whose first trial resulted in a disagreement, was taken into court a second time and assessed a fine of \$150. Approximately 3500 licenses were checked by deputies during the month.

A new speed boat has been purchased and is being used on the lower Sacramento and San Joaquin. Headquarters for this boat have been established at Vallejo.

A review of cases shows:

A violator with six robins, a meadow-lark and a killdeer in his possession was apprehended by Deputy Post, of Salinas. He pleaded guilty and was given a fine of \$100 by Judge Ray Baugh, of Monterey.

Judge Fitzgerald, of Livermore, levied a fine of \$50 to a violator accused of killing deer in closed season.

The killing of a dove in closed season cost A. J. Andrews \$25 when taken before a judge by Deputy George Magladry.

Justice J. W. Shanklin, of Placerville, assessed a fine of \$50 against two men caught with 60 pounds of deer meat in their possession during the closed season. Warden K. J. Ransdell, of Ukiah, made the arrest.

The killer of a pheasant apprehended by Deputy O. P. Brownlow, of Porterville, was fined \$25 by Judge Lumley.

A Japanese caught with nongame birds and hunting without a license by Deputy Holladay was fined \$75 by Judge Hoesch of Gilroy.

Deputy J. M. Hughes arrested Frank dePalma for killing nongame birds. He was assessed a fine of \$150 by Judge Charles of Palo Alto.

During January a roundup of notorious market hunters was successful. One man was taken at 2 o'clock in the morning by wardens Shearin, Willard, Johnson and Sellmer, near Willows, while in the act of making a "big shot." He was taken before Justice L. P. Farnum, of Willows, where he was assessed a total sentence of 225 days. The court decided that use of the "Long Tom," or extension automatic shotgun used by the hunter was good for 100 days; that night shooting was good for an equal sentence and that 25 days additional would be about right for having over the legal limit of birds. The wardens found 100 birds on the ground after the market hunter's big gun had ceased firing.

Justice C. S. Johnson, of Stockton, assessed a fine of \$150 each upon three parties taken in that city by police officers R. E. McHugh and Tom Long, with 200 wild ducks in their possession. Before paying the fine, the three violators told the court they were engaged in running a gun club near Willows, had killed the ducks the night before their arrest and were transporting them to San Francisco.

Two violators shooting from motor boats taken by Warden Ed Glidden, of San Diego, were fined \$75 by the local justice. Still another was fined \$50 for a similar offense.

Department of Fish Culture.

On January 20, 1927, a fresh supply of eastern brook trout eggs was received from the Pennsylvania Fish and Game Commission. Packing cases of special design furnished by the California Fish and Game Commission were used in making the shipment and the eggs arrived in better condition than any previous shipment.

At the end of January a total of 4,905,000 salmon eggs and fry and 8,307,000 trout eggs and fry were at the Mount Shasta Hatchery.

The installation of the refrigeration plant at the Mount Shasta Hatchery has been completed. Eighteen tons of ice has been made and stored. The ice-making machinery is automatic and within a short time, the storage room will be full.

Extensive repairs to racks and traps were made necessary early this spring by the unprecedented rainfall. High water has interfered with the take of eggs at most of the egg-collecting stations.

Over 100,000 steelhead trout fingerlings were liberated in a Santa Cruz County stream from the Brookdale Hatchery in

short distance and used by the assistant as living quarters until more commodious quarters can be furnished the help.

Work on Big Creek Hatchery has been delayed, owing to the stormy weather and a misunderstanding regarding the material to be used for the hatchery troughs. We are planning to place the first eggs collected at Scott Creek in the Brookdale Hatchery and when eyed ship them out to other stations, so as to have the last of the eggs collected eyed at Brookdale and sent to Big Creek when the hatchery is completed. The troughs as first made had to be rejected, but the construction of the new troughs will be



Fig. 29. The new Yosemite hatchery baptized by snow, February 27. Construction began last fall and was completed during March. Photograph by George Magladry.

February. About 149,500 steelhead eggs had been gathered up to January 31.

The work of construction on the Yosemite Hatchery is nearly completed. The troughs were installed during the month and the painting and finishing up of the interior is well underway. The settling tank is completed and connections to the main building will soon be made. There are two rooms planned for office and feed room that can be used temporarily for living quarters for the foreman and a small building that was used by the constructive foreman can be moved back a

rushed and the manufacturer has promised to make an early delivery.

The Board of Public Works, after a close study, estimate there will be approximately \$1,200 left after the hatchery is completed. They also estimate there will be approximately \$5,000 left after the Yosemite Hatchery is completed. The aquariums are not built, but the room is ready to have the aquariums installed when the funds are available for that purpose. It will be advisable to use the surplus money left over after the completion of the Big Creek and Yosemite hatcheries to erect cottages for the help

at Big Creek, where living quarters are necessary. During the coming summer the aquariums can be installed at the Yosemite Hatchery.

During January, Mr. Coleman made a biological survey of Salton Sea at the request of the Brawley Chamber of Commerce. He found the only fish of commercial value in this body of water is the so-called mullet. There are some sunfish, perch, also a species of the large minnow known as the western pike. The water is alkaline and experiments should be carried on this season to determine whether some good food and game fishes will thrive in the waters of Salton Sea.

It is probable that some species of bass or catfish will do well in this body of water, but another investigation and analysis of the water should be made later in the season, so that all conditions will be understood before introducing any more species of fishes. This survey can be continued at intervals during the coming season in conjunction with other biological investigations.

Twelve thousand eastern brook eggs were secured last fall at Gull Lake in Mono County by seining the fish. The new spawning station at June Lake also furnished a very fine take of steelhead eggs.

Department of Commercial Fisheries.

The Division of Scientific Inquiry of the U. S. Bureau of Fisheries is adopting California's scientific program and is advising other states to follow the example of California. Elmer Higgins, in charge of the division, and O. E. Sette, in charge of the Division of Fishery Methods and Statistics, were both trained at the State Fisheries Laboratory.

The director of the Department of Commercial Fisheries attended a meeting called by the U. S. Bureau of Fisheries in Washington, D. C., where he read a paper on "The Problems of a Fishery Administrator" and joined in the discussion at a meeting of the Scientific Advisory Committee. In December the director also attended a meeting of the International Salmon Investigation Federation at Seattle. The Federation decided to appoint a subcommittee to report back at the next meeting on the efficiency of the different types of fishways and elevators thus far devised for solving the problem of lifting salmon over high

dams. At the same time they adopted resolutions calling attention to the fact that in spite of publicity, the problem is far from being solved.

State Fisheries Laboratory.

Analyses of the boat catch of striped bass, salmon and shad have been prepared and are ready for use by the legislative committees, which will have to deal with proposed legislation. Some work on price fluctuations for these fish has also been done. A correlation with rainfall and the catch, so far as the Sacramento river is concerned, apparently has been discovered. If such a relationship exists, it possibly is due to fish avoiding gill nets in clear water when the river is low.

A manuscript covering the gear and fishing methods used by the sardine industry on Monterey Bay has been prepared and is ready for the printer. It will be issued in the fish bulletin series.

Each research worker at the laboratory is urged to make four trips a year on a commercial fishing boat so that first hand experience may be a guide in assembling data. Such personal observation of fishing conditions is considered necessary to satisfactory work.

The members of the staff meet weekly for a Journal Club. Current technical papers are reviewed and discussion of pertinent problems fills the remaining time.

Progress on the barracuda investigation is being made. A bibliography of literature has been prepared and age studies by means of scales have been attempted. Sampling has given material for studies on weight and rate of growth.

A series of photographs showing all of the fishes of commercial value is being made. Eventually the series should cover all of the northern and southern fishes.

The annual cross-sections of the Pismo-Oceano Beach to provide a census of Pismo clams was completed last November. The number of clams of each age class are counted on selected sections of the beach. A comparison of the results for the past four years is being prepared.

Bureau of Hydraulics.

Many inspections of screens and ladders have been made and several cases of pollution cleaned up. The attempt continues to get up-to-date data on every screen and ladder in the state.

Installation of the screen on the Prattville outlet of Lake Almanor, leading to the hydro-electric plant of the Great Western Power Company near that place, has been completed, according to a recent letter accompanied by photographs, from Ernest E. Behr, comptroller of the power company.

Screening of the power company's outlet from the lake was made necessary by the fact that large numbers of fish from the lake were declared by sportsmen to have been drawn out through the tunnel and into the turbines. Arrangements for the installation followed a series of conferences between leading sportsmen and power company officials, held in the San Francisco offices of the Commission early last fall. Waters taken out at this point are conveyed through a tunnel between three and four miles in length into Buck Reservoir, and finally into the plant at Caribou.

Stream pollution conditions in Ventura County have been greatly remedied in recent weeks. A new salt water line from the fields in the Ventura river valley has been completed and an agreement has been reached with the Petroleum Securities Corporation under which that concern states its willingness to guard against further pollution, and has promised new safeguard work toward that end to be completed by March 1.

In the Hopper canyon section, the Julian Petroleum Corporation has advised that all operations have ceased and that complete protection against further pollution of that stream will be installed before work is begun again.

A new waste oil and water line in the Signal Hill fields, where pollution was rampant up to a few months ago, has been reported as completed. Through use of this line all offending companies are now carrying their wastes out of the natural waterways and into a sump where much of the refuse is reclaimed and the rest of it burned. It was at this point that the commission, after an exhaustive investigation, was forced to start action against twenty-one oil pro-

ducing concerns in order to clean up a condition long complained of by citizens of Long Beach.

Huntington Beach, where considerable oil pollution is known to exist, is next in order, and greatly improved conditions will be demanded at that point.

Bureau of Education and Research.

A display rack in the main office has been provided with various maps showing game refuges, patrol districts, etc., and with displays of photographs showing the state game farm and summer resort educational activities. A fine series of colored plates helps in distinguishing the various hawks and indicates the economic value. One leaf of the rack displays the various series of publications issued by the commission.

On January 3, 1927, the office of the Bureau of Education and Research was moved from the Museum of Vertebrate Zoology, Berkeley, to rooms 710-713 in the Postal Telegraph Building, San Francisco. With additional floor space, better equipment and better coordination with other departments, it is expected that the bureau will function more efficiently.

An outline of a course on "Natural Resources of California" useful in public schools, has been prepared and furnished Fort Bragg schools where it is being utilized in the fifth to the eighth grades. Should this trial in Mendocino County schools prove satisfactory, the outline will be made available to all teachers desiring to have it. The outline has material for discussion in class room work, bearing on soil, mines and mining, forests, fish and game. Below each main heading is listed the organization concerned in conserving the resource and lists of books and pamphlets useful as references.

A new film entitled "California Fish and Game" has been prepared which gives glimpses of the principal fishes, game birds and mammals of the state, including trout, salmon, valley fishes, wild pigeon, grouse, deer and elk. This film is now available for use by schools and other organizations with proper projecting apparatus.

Bureau of Statistics and Game Problems.

An anti-venison serum has been prepared and is now ready for use. It will detect deer meat as against any other kind of meat in a dilution of one to one hundred thousand. When meat supposed to be venison is confiscated by a game warden, he may now send it in for test. Often, a violator claims his venison is goat meat or mutton. The use of this scientifically accurate test will be useful in future cases when sure identification of deer meat is involved.

A conference was recently held at the Hooper Foundation for Medical Research for the purpose of discussing the possibility of introducing dangerous diseases which exotic game birds might harbor. It was pointed out that the danger lies in the spread of diseases which may develop on the state game farm when domestically reared pheasants are planted since no introduction of foreign birds are contemplated. Precautions are being taken to avoid danger from this source by making post mortems of all birds which die at the farm, by testing all foster mothers for tuberculosis and other disease, and by sanitary measures to assure pure food and drinking water.

Bureau of Game Farms.

The early months of the year found the breeding pens at the game farm filled with greens: alfalfa, wheat and kale. This splendid growth of green feed should assure fine egg production and high fertility.

There is found elsewhere in this issue, an article on game bird farming prepared to stimulate interest in furnishing more and better birds for the fields. It is based on the results of practical experi-

ence and should answer the many questions put by the amateur game farmer.

The pens left uncompleted last season have been piped, plowed and otherwise conditioned for use this spring. Alleyways have been graded and graveled. From both the standpoint of utility and appearance the game farm has been greatly improved during winter months.

Bureau of Public Relations.

The Service Bulletin issued by this bureau is bringing needed coordination of the working force of the Commission. In addition to items for the betterment of service, the monthly issues carry personals which are informative and help weld the organization into a friendly group of workers.

A review of the items printed by newspapers show that they are interested in using stories relating to arrests and convictions. Eight such stories were issued during December and many since. More will appear in the future as contact has been made with editors in whose papers the publicity items issued by the Commission have not appeared.

The director of the bureau has been active in addressing service clubs and fish and game protective associations throughout the state. All give a listening ear to the activities and plans of the Commission which forms the topic of discussion.

On January 7 and 8 a cabinet meeting was called to discuss proposed legislation and at the same time to consider the report of the Fish and Game Study Committee of the California Development Association. With but few exceptions the report of the committee met with the approval of Commission department heads. Plans were laid for satisfactorily handling the new program of fish planting.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

THE OCCURRENCE OF THE JAPANESE HERRING.

The Japanese herring, *Etrumeus Micropus*, is rarely found at the San Pedro fish markets. Elmer Higgins has reported finding this species at the markets on three separate occasions, November, 1919, July, 1920, and June, 1921. Another specimen of this species was found at the markets on February 3, 1927. It had a total length of 35 centimeters and a body length of 29.5 centimeters.—Carl R. Jackson.

WANTED: HOOKS FOUND IN ALBACORE AND TUNAS.

Hooks found in tunas and tuna-like fishes are valuable scientific evidence of the habits and migrations of these species. All persons discovering them are urged to send hooks and other objects found in the bodies of tunas to the California State Fisheries Laboratory, Terminal, California. (Expense for postage will be refunded.) The specimens sent in should be labeled with the common name of the fish, the date and place of capture, the name of the finder, and the approximate length of the fish (tail fin included).

The tunas are wanderers of the sea. They are supposed to range widely over great ocean areas, but the limits of migration in particular species are not known. In most cases it is unknown even whether fish inhabiting different localities, but bearing the same names, are really identical in structure and habits.

Tagging has not seemed as practicable a method of investigating the migrations of tuna, as it has for some other fish. Therefore, Dr. Massimo Sella, of the Royal Italian Oceanographic Committee, has suggested collecting the hooks occasionally found in the mouths and stomachs of tuna, which may have been carried by the fish from far distant grounds, and trying to find out where these hooks came from. As Dr. Sella says: "It is not such a rare event to find a hook in tuna, though it may not happen every day, and every one so found is a precious bit of evidence—a kind of ticket which comes attached to this submarine voyager." By this means preliminary results have already been obtained in Europe. In tunas captured in the central part of the Mediterranean, hooks have been found coming from both eastern and

western ends of this sea, and from the Atlantic coasts of Spain and France. Dr. Sella interprets this as evidence that there is no racial difference between the tuna of the Mediterranean and that of the Atlantic seaboard of Europe. It will be very interesting to obtain evidence of the Pacific migrations of the tunas.—R. M. T.

SAN DIEGO'S LOBSTER CATCH EXCEEDS THAT OF 1926.

On February 6, C. F. Maddox of the San Diego office of the State Fish and Game Commission announced that the San Diego fishermen had already caught more lobsters than were caught during the entire season last year; 805,522 pounds so far this year as against 729,141 pounds last year. As the California lobster season did not close until February 22, and the Mexican season not until March 15, last year's record had evidently been left far behind, as huge catches were still being brought in.

Senor Jose Leon of the Mexican Fisheries Department will recommend that next year the Mexican lobster season open and close on the same date as the California season.

During January nearly one million and a half pounds of fish were brought to port by the San Diego fishing fleet. The sardine catch of 438,499 pounds did not equal that of December, nor of January, 1926. The complete catch of sea food was 1,417,101 pounds, practically one-third of this amount consisting of sardines.

The largest single haul of sardines was made during January at San Pedro by the Franco-Italian Packing Company's launch. The catch of 265 tons of sardines in one giant net is the largest single catch recorded for California, and probably for the American waters.

ALBACORE CAUGHT NEAR MONTEREY.

For the second consecutive year albacore have been caught near Monterey in abundance sufficient to warrant interest. Last year was the first time in many years that albacore had been noticed and a great deal of excitement among the fishermen of San Francisco and Monterey resulted over the prospects of the development of a new fishing industry. Albacore appeared off Point Sur and near-by regions last year about Septem-

ber 5, according to the notes of W. A. Selle, and were caught throughout the month and for some time following. This year they appeared in the same region late in October, and have continued to be caught intermittently throughout November and the first few days of December. No catches have been reported as being caught in Monterey Bay. Two boats delivered small catches at Santa Cruz during the early part of November, but the location of the fishing grounds could not be learned. The Point Sur region is the location of a large amount of market fishing.

The best catches were made during the first and second days of November when weather conditions were better than at any time since. On those two days the total receipts for the Monterey markets were approximately twelve thousand and thirteen thousand pounds, respectively. For the remainder of the month the catches varied greatly and there were twelve days during the month that no albacore were taken. Fairly good catches were brought in during the last three days of November. Still there is no assurance that the "temperamental tuna" will remain in this vicinity for long.

A total amount of 29,566 pounds of albacore was delivered to the Monterey markets during November out of a total take of over 62,000 pounds. The market price is ten cents per pound so that even though the appearance in this region is short, it is, nevertheless, of considerable importance to the forty or fifty fishermen that have been bringing in catches. These same fishermen spent the spring and summer months in San Pedro attempting to catch albacore, but the season there was below normal.

The gear that is being used is the ordinary market fisherman's boat equipped with jig poles and jigs which most of the fishermen carry with them. Individual boat catches range from a few pounds to well above seven hundred pounds and a goodly number range about five hundred pounds when fishing is good. —C. B. Andrews, December 16, 1926.

VISITORS.

Visitors to the State Fisheries Laboratory during the last few months have been even more than usually numerous and interesting. Just before Christmas, Mr. W. F. Thompson, formerly in charge of the laboratory and now director of investigations for the International Fisheries Commission, United States and Canada, spent about ten days here, going over the programs of work outlined by

the various staff members and joining in our conferences.

C. B. Andrews, engaged in sardine work for us at the Hopkins Marine Station, W. C. Herrington, who is attending Stanford University, and S. S. Whitehead, who is making scientific observations at San Diego, also spent several days here during December.

We likewise renewed cordial relations with our former staff members, W. C. Van Deventer, now studying medicine at the San Francisco Hospital, and W. A. Selle, who is instructor in physiology at the Santa Barbara State Teachers College. Paul Bonnot of the San Francisco office stopped for a few days' study in connection with his assignment to work on the seals and whales of the coast.

During nearly the whole of January, E. C. Scofield made use of the laboratory's facilities for his work on the life history of the striped bass. A progress report of his investigations was presented to the assembled scientific staff.

In addition to employees of the Fish and Game Commission, a number of others have paid us calls. G. A. Rounsfell, who is working for the U. S. Bureau of Fisheries on the Alaska herring, spent several days of his honeymoon here, reading recent papers on herring research. He also presented a report of his work to one of our weekly evening "Journal Club" meetings. Dr. Willis H. Rich, director of the International Pacific Salmon Investigations Federation, gave us a Saturday afternoon on his way back to Stanford University from Washington, D. C., where he had attended the conference of the division of Scientific Inquiry of the U. S. Bureau of Fisheries, called late in December. Also fresh from this conference, N. B. Scofield, head of our Commercial Fisheries Department, gave us an interesting review of the speeches and events which characterized the Washington gathering.

Other notable visitors have been Mr. Lewis of the Scripps Institution of Oceanography, whose work on the food of the sardine looks forward to results that may perhaps be correlated with some of the work done here on this species; R. S. Fellers, who is studying chemical problems connected with the sardine packing industry at the laboratory recently set up in the Wilmington cannery of the Coast Fishing Company; O. W. Lang, of the Hooper Foundation for Medical Research, who is also interested in chemical and bacteriological investigations on canned fish; Florencio Talavera, a Philippine government zoology student, and

Mr. Parks of the American Can Company. All of these people, as well as the staff members of the International Fisheries Commission (United States and Mexico), have called on the Laboratory Library for some service, large or small, and it is gratifying to find them very appreciative of such help as we can give. They, in turn, have contributed to broadening our outlook on fisheries investigations in general, and have often put us in touch with information of much value.

RUTH THOMPSON, Librarian.

CALIFORNIA SARDINE INVESTIGATIONS.

Being a Review of Fish Bulletin No. 11,
"The California Sardine."*

By RUTH MILLER THOMPSON, Librarian,
California State Fisheries Laboratory.

Fish Bulletin No. 11, recently issued by the California Fish and Game Commission under the title, "The California Sardine," is exciting considerable interest because several features of the general sardine investigation program, to which this is the first extensive printed contribution, are almost unique in American fisheries research. It contains five papers, which present the results of work carried on by the staff of the California State Fisheries Laboratory from 1919 to 1923, under the direction of Will F. Thompson, now in charge of investigations on the North Pacific halibut for the International Fisheries Commission. The publication of this research has been delayed, due to the fact that while the papers were still in preparation their authors, with but one exception, left the state's employ. Each article in the bulletin details a separate special study on some limited phase of the sardine problem; yet the fact that clearly defined aims were ever present in the minds of all contributors, has resulted throughout in a real unity of spirit. The plan of research was comprehensive and well reasoned; every part of it is an organic part. There is as much significance in the fact that certain avenues of attack usually emphasized in fishery work are intentionally omitted or their use postponed, as there is in the fact that certain other approaches are assiduously followed.

*Two thousand copies of the Sardine Bulletin were printed; some are still available for distribution from the California State Fisheries Laboratory, Terminal Island, California. Shorter articles about the history and methods of the sardine fishery in California appeared in the "Sardine number" of CALIFORNIA FISH AND GAME (Vol. VII, No. 4). This edition is now practically exhausted.

The fish in the waters of any state are the property, not of the federal government, nor of any individual commercial interests, but of the state itself. The state's agents are therefore in duty bound to insist: (1) that the use without waste of as much fish as can be caught each year without endangering the permanent supply, be encouraged; (2) that any use of fish which threatens depletion of a species be rigorously prevented. But conservation officers can not insist on these two fundamentals unless they have reliable knowledge of the fish supply.

If they have no rational basis for the legislation they favor, how can they be sure of its effects? Definite knowledge of the supply of fish is not easily gained; mere experience in any branch of the fishing "game" does not provide it. It can only be secured by well-planned scientific research prosecuted continuously and consistently over a considerable period of years. Under these circumstances, scientific conservation research that receives state support may well be concentrated on studies of supply. All work, however interesting and valuable, which does not aim first to describe what variations in abundance actually occur, and then to determine whether the causes for these variations are natural conditions or overfishing, is, from the point of view of the welfare of a particular species or fishery, and therefore from the point of view of the state, undoubtedly of secondary importance.

These are the ideas which form the background of California's sardine investigation program, and which have protected the state from expending large sums on merely incidental researches only indirectly related to the state's own major interests.

In the introductory paper of the series, entitled "The California Sardine and the Study of the Available Supply," Will F. Thompson shows the importance of the sardine fishery as compared with California fisheries for other species, and justifies the adoption of the type of investigatory program followed. A careful comparison of the structural peculiarities of California and European sardines reveals that the two types are sufficiently alike so that methods of investigation applied to one may be expected to yield worthwhile results when applied to the other, but sufficiently different so that it is unsafe to assume anything but a very general similarity as to habits and details of life history.

Mr. Thompson discusses the distribution of sardines along the Pacific Coast, as to amount used and sizes present, but

he seriously doubts whether the data at hand give a true picture of the actual abundance. The seasonal nature of the catch is described, and possible causes for variability in the length and character of seasons are discussed. The author concludes his analysis of the complexity of the problem by saying: "We have, therefore, been compelled to acknowledge at once that our outlook upon the natural abundance of the fish is through a medium, which surely distorts it, and which is affected in unknown ways by varying conditions. The nature of this medium, the fishery, must enter into all calculations, and the explanations of variations in abundance must first of all be sought in the method of the fishery and its peculiarities. However potent the biologic factors, they must necessarily be obscured and without clear definitions among the welter of economic influences." This view is supported by an extensive analysis of foreign literature, which shows that fluctuations in the European sardine fisheries have not been attributable to a few simple causes. Indeed, the separation of biologic from economic factors has there proved almost impossible, especially in view of the general inadequacy of available statistics.

Following this, Mr. Thompson discusses the general features of the commercial catch in California, its variations from year to year, usual and unusual, the effect of dominating types of fluctuations, and intra-seasonal fluctuations. He emphasizes the importance of adequate statistical records showing the size of daily catches and the yield per unit of effort, and indicates that while general life history studies are of great value in guiding and directing the plan of research, they should not usurp the place of supply studies as major problems. The author next turns to a consideration of what material is actually on hand in California for catch analysis. The reason for not at present employing the "pink ticket" catch statistics in the sardine investigation, and the necessity for qualitative sampling of the catch are made clear. Attempts at age analysis of samples by means of "reading" the scales of sardines are reported to be as yet disappointing. A general review of the data collected precedes a conclusion, which points out the logical future development of the work, and gives acknowledgments.

The second paper, by O. E. Sette, now in charge of the Division of Fishery Industries of the U. S. Bureau of Fisheries, is the report of a piece of work with clear cut aims and results that may be readily summarized. It is an endeavor

to determine how extensive and how frequent sampling of the commercial catch need be, in order to be adequate and representative. The picture of the catch given by daily sampling is used as a standard; with it are compared the pictures of the catch obtained from alternate-day, semi-weekly, less frequent, and irregular sampling systems. The results of Mr. Sette's work show that without doubt (1) no system of sampling the catch is sufficiently random to represent accurately the entire population of sardines, i. e., the commercial catch is itself selective; (2) regular sampling at least twice a week is required to produce data which has a fair likelihood of representing the catch itself in a reasonably accurate fashion. The fact that this study was carried through is eloquent evidence of the thoroughness of the whole sardine program. In most fishery investigations there has been a tendency to easy assumption of the representativeness of whatever samples were conveniently obtainable, without adequate analysis of the errors involved.

Mr. Elmer Higgins, now in charge of the Division of Scientific Inquiry of the U. S. Bureau of Fisheries, presents in the third paper "A Study of Fluctuations in the Sardine Fishery at San Pedro." Methods of collecting the very extensive data are here analyzed, the sardine fishing area and changes in the fishing localities, the sizes and size-fluctuations in the San Pedro catch over both short and long periods, and the meaning of these shifts in size composition, are also detailed. Dominant size-groups which progress up the size scale with annual growth are demonstrated. Mr. Higgins closes his paper with a discussion of the practical importance of understanding size fluctuations of sardines in the commercial catch. The dependence of the character of the pack on the size composition of the runs is so obvious, that with knowledge of the size-classes dominant in previous years, it may be quite possible to foretell important characteristics of the coming season's pack.

Paper No. IV, by W. F. Thompson, is entitled "Errors in Method of Sampling Used in the Study of the California Sardine." Analysis of the sources of error in particular research methods, which is all too often neglected, will certainly contribute to raising biology to a position as one of the exact sciences. This paper is more technical than the others, but will well repay careful scrutiny by any one contemplating research on similar problems. Apparently the commercial catch of sardines contains two independently

variable units, large fish, and small fish, with certain relatively constant peculiarities. Through these a dominant or lacking year-group must pass as it grows and its appearance is undoubtedly altered by their nature. In conclusion the author says: "At present any forecasting of the 'catch' of sardines is limited . . . to the sizes below 225 mm. . . . Nevertheless, so clear cut and overwhelming are the variations between the year classes which have during the past four years entered the commercial catch, that the rosiest hopes may be retained . . . that the normal course of an age-class through the various peculiarities of the catch, etc., may be defined within narrow limits, and that the course of a certain age-class through a group may finally prove to give some indication of the relationship that class will hold in other groups."

The final paper, written by W. L. Scofield, is entitled, "The Sardine at Monterey; Dominant Size-classes and Their Progression, 1919-1923." Methods of taking samples with a view to insuring their representatives are detailed. The data summarized in this report comprise measurements of 41,500 fish taken from 2000 boatloads over 28 lunar months. While the main characteristics of intra-seasonal fluctuations in the catch of sardines are briefly outlined, most of the paper describes fluctuations from year to year. Portions of the four seasons are contrasted and great care is taken to insure that these portions are strictly comparable. The various size-classes do not always appear in the same proportions at corresponding seasons. A dominant size-class does appear in the catch and its progression through three successive years is traced. In view of the complex nature of the data itself, and of the many influences which undoubtedly affect it, it is very significant indeed that dominance is not wholly obscured by other factors.

The collection of data begun in 1919 has been continued according to the same plan ever since and that since 1923 will form the material of future reports. At the present time certain observations are being made at San Diego as well as at Monterey and at San Pedro. Undoubtedly the next series of papers will furnish information of even greater immediate value than do the preliminary fundamental investigations reported in Fish Bulletin No. 11.

SERIALS NEWLY ACQUIRED BY THE CALIFORNIA STATE FISHERIES LABORATORY.

Recent accessions to the library at the

California State Fisheries Laboratory include several sets of publications which should interest many besides the laboratory's own staff members. A practically complete set of "Biometrika," indispensable to statistical workers, is now on the shelves. (Vol. IV, No. 4, only, is missing.) All the "Bulletins" of the *Institute Oceanographique* at Monaco (486 numbers) have been purchased, and a set of the first series of the "Annales" of this institute is on the way. (All numbers of the second series which have so far appeared are already in the library.) Through the courtesy of Dr. H. C. Redeker of the Royal Institute of Fishery Research at Helder, Holland, and of the Dutch government, a large series of Dutch fishery publications were sent. These include statistics of the fisheries since 1901 and a great number of biological studies on commercially important species. The French government has also been kind enough to present us with a full set of the publications of the "Deuxième Expedition Antarctique Française," and many other miscellaneous documents. It is gratifying to be informed that a considerable series of Italian government reports, largely issued by the Royal Italian Oceanographic Committee, have been dispatched to the library. The last have been sought for some time and it seemed particularly difficult to secure them. Whereas a year ago practically no Italian documents were available to the library, quite a respectable Italian section has now been accumulated, mostly by exchange.

Exchanges established with Spanish, Portuguese, Latin-American, Australian, Egyptian, Esthonian and Turkish institutions have revealed an unexpectedly large quantity of marine zoological publications from these countries. The U. S. S. R. Society for Cultural Relations with Foreign Countries has procured for us a surprising array of Russian series, issued by marine stations, scientific societies, and government bureaus. In addition to the above recent purchases include a full set of the *International Fisheries Exhibition Literature* (1883) and of the "Archiv für Fischereigeschichte," a number of volumes of the "Zeitschrift für Fischerei und deren Hilfswissenschaften," the "Tidiskrift for Fiskeri" and "Nordisk Tidiskrift for Fiskeri" and many separate numbers and volumes to fill out partial sets already in the stacks. The library now has exchange arrangements with at least 200 institutions, and with many individual scientists besides, —R. M. T., February 28, 1927,

LIFE HISTORY NOTES.

MALE CRABS LEGAL IN CALIFORNIA.
CALIFORNIA.

Beginners at the sport of crab-fishing are often at a loss to distinguish between male edible crabs (*cancer magister*), which are "fair game," and females, which are protected by law at all times.

This question, however, may be solved by a brief examination of the flap upon the under side of the victim's shell, as is shown in the accompanying illustrations.

In the male crab the abdominal flap is narrow and its segments increase in width very evenly from the tip.

ing found in desert conditions in San Diego County.

It is quite probable that the opossum is really more widely distributed in southern California than above indicated, but up to the present time the reports at hand indicate only the distribution as noted.—H. C. Bryant, Berkeley, Calif.

ANNUAL CENSUS OF WATERFOWL
AT LAKE MERRITT, OAKLAND,
CALIFORNIA.

The annual count of the wild fowl at Lake Merritt was taken this year on the

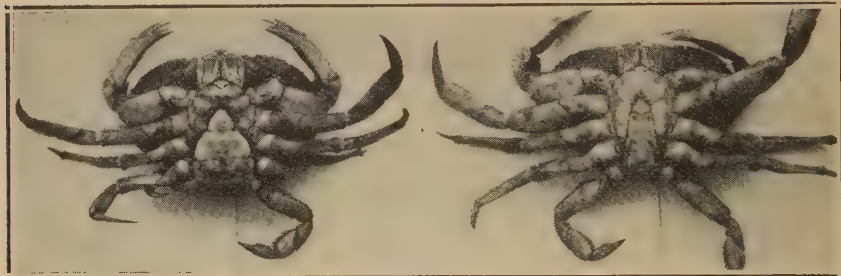


FIG. 30. Female and male edible crabs taken at Bolinas Bay, February 6, 1927. Note the wider abdominal flap of the female. The male alone is legal for the sportsman. Photograph by W. I. Follett.

On the other hand, the abdominal flap of the female is very broad, and increases in width abruptly below the first segment.—W. I. Follett.

THE OPOSSUM REACHES SAN DIEGO
COUNTY.

The rapid spread of the opossum (*Didelphis virginianus*) in northern California from a focal center at San Jose has been noted, as has also its rapid spread in southern California to a point as far north as Oxnard and as far south as Temecula from other focal centers. Mr. Frank F. Gander has recently written us that a specimen was taken on December 27, 1926, in La Puerta Valley, San Diego County, altitude 2,100 feet. Here desert conditions exist as the place where the animal was trapped is described as a "mesquite thicket" near a creek. Thus it will be seen that the species continues to invade new territory. Whether it will eventually acclimatize itself from mountains to seashore is still a question. Yet already the animal has been reported from elevations of 5000 feet in the Sierra and Sequoia National Park and now comes the report of it be-

ing found in desert conditions in San Diego County.

Canvasback	811
Baldpate	355
Coot	350
Pintail	233
Ring-billed Gull	201
Scaup	73
Shoveller	33
Ruddy	30
Eared Grebe	20
Snow Goose	6
Cormorant	5
Mallard	4
American Golden-eye	4
Western Grebe	4
Glaucous-winged Gull	4
Buffle-head	2
California Gull	2
White Pelican	1
Total	2,138

The greatest decrease was noted among the pintails. Their absence at this time appears to be due to local disturbances.—Joseph Dixon and George M. Wright, Berkeley, California.

Museum of Vertebrate Zoology,
Berkeley, California, January 21, 1927.

Two domestic swans not included.

NOTES ON THE FOOD OF THE WESTERN ROBIN, KINGFISHER AND OTHER BIRDS.

During the summer of 1926, a special study of the food of the western robin (*Plantasticus migratorius propinquus*) was made in the region around the north end of Lake Tahoe, since this is a veritable "robins' roost" and a favorite nesting place, with the idea of determining particularly whether robins destroy young trout fry in the streams. Three pairs nested and raised their families on the hatchery grounds and the woods about were full of them. Hundreds of observations were made of the adults when they were visiting the small streams and the shores of the lake for the purpose of obtaining food for themselves and young, only enough specimens being taken to confirm the observation made with binoculars.

In brief, it is sufficient to say that I have yet to find my first fish in a robin's stomach, or to see one being caught by this bird. The food consists entirely of insects procured from the weeds and grass or small willows along the shore, and of the larvæ of water insects secured along the bank of the streams or shore of the lake. In the wet meadows immediately adjoining the hatchery grounds, a large proportion of the food of the adults and of that supplied to the young consisted of the "water-earthworms" which are very abundant in these shallow creeks. These creeks were at all times full of small fry which the robins could have easily secured, had they so desired. Therefore, seeing a robin on the bank of a creek does not mean that the robin is destroying the fry in the creek.

The western belted kingfisher (*Ceryle alcyon caurina*) is a great pest around hatchery ponds and rearing ponds. Twenty of these birds were killed about a natural pond, after it was stocked with young fry, although beforehand only one pair was stationed here. As soon as one was killed another took its place. The stomach of each specimen taken was carefully examined and in every case from one to three small fry $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long were found. Kingfishers do not, or can not, take the very small fry. On the lake shore, their food consists almost entirely of minnows, as the trout are too swift for them. Through the binoculars, I watched many of them fishing and without securing specimens was able to determine that about nine attempts to secure trout in open water are failures to one success.

A Cooper hawk (*Accipiter cooperi*) was shot at about 7500 feet elevation.

Its stomach contained one large striped chipmunk just killed, the remains of a small chipmunk and of a baby grey squirrel.

Observations with the binoculars were made on many water birds with the following conclusions as to food:

American eared grebe (*Colymbus nigricollis californicus*). This grebe was quite common about the north end of Lake Tahoe, breeding about points where sufficient tules could be found for a nesting site. It was a common sight to see the young riding on the mother's back. Counts of as many as twenty-one on a single mother's back were made. Observations show that the food of the adults consists mostly of minnows. The young begin to catch them as soon as they are able to swim about well which is about ten minutes after they break the shell. When most active, the mother catches a minnow every five minutes. Their food is not all fish, however, as they secure a large number of insect larvæ, snails, and also vegetation in the shallow waters along shore.

This bird was also present on Mono Lake in considerable numbers with the pied-billed grebe and living on the Mono Lake shrimp.

The merganser ducks probably are the worst offenders in the destruction of young trout. I have seen one swim under water several feet and capture a trout twelve inches in length. It also wounds many trout which it is unable to hold, and which probably die later from the injuries.

Pied-billed grebe (*Podilymbus podiceps*). During October this bird was present in countless thousands on the lake, feasting on the Mono Lake shrimp. They were distributed evenly over the entire surface of the lake and very tame, hardly getting out of the way of the boat.

Western grebe (*Aechmophorus occidentalis*). A few pairs of this species were seen in Hot Spring Cove, at the east end of Paola Island in the lake, where the Mono shrimp was very abundant. Mrs. McPherson, wife of the owner of the island, says they breed here.

Mallard duck (*Anas platyrhynchos*). These ducks were present in a flock of a thousand or more at the mouth of Rush Creek, but no opportunity occurred to study their feeding habits.

Black-necked stilt (*Himantopus mexicanus*). Pairs of these birds were present in considerable numbers about the lagoons, and watching them stalk the immense swarms of Mono Lake flies, into which they would dive head first for

mouthfuls, afforded us considerable sport.

Least sandpiper (*Pisobia minutilla*). This bird was abundant in flocks of a hundred or so on the lake shore and lagoons, feasting on the flies and their larvæ.

Since many waterbirds resort to Mono Lake, there is abundant proof that waterbirds can exist and prosper without any fish food in their menu, for there are no fish in this lake.—George A. Coleman.

FOOD HABITS OF TROUT.

When a trout strikes at your royal coachman, what does he think he is getting? We wondered. Out of sheer curiosity and a desire, perhaps, to improve our ability as anglers, we began to investigate the matter. Soon, with the interested assistance of park anglers, entomologists and chefs, we were deep in trout dietetics.

The very first day of our investigation proved eventful. While taking our morning swim in the Merced we saw a lone fisherman on the opposite shore. What luck! Here we could get material with which to start at once. We waved excitedly and asked the man if he had any fish. Yes; but why two young ladies were so excited about his four trout we could

not make him understand across the river. Much to his amazement we dived in and swam over. Thus we met Tony, Camp Curry cook and one of the most enthusiastic fishermen in the valley. Surely we could have the stomachs from his fish—all that he caught for the rest of the season and all those which came into the kitchen of Camp Curry.

That afternoon those four Rainbow trout stomachs from the Merced were opened at the Yosemite Museum. Professor Essig of the University of California was present. From what appeared to us unrecognizable insect fragments Mr. Essig began pulling out almost perfect specimens—ladybird beetles, caddis cases, hoplias, a wasp. Suddenly he became excited, examined an insect shell closely, turned to a book, read for a few moments, examined the specimen again under a lens, and finally announced that here we had the larva of a rare insect—none other than the "aquatic dascillid." Surely a trout's stomach was the last place one would expect to find this. Thus our first day ended with enthusiasm running high.

From June 21 to August 5, 1926, 100 stomachs were examined. The appended table gives our data concerning them:

HUNDRED TROUT STOMACHS EXAMINED.

No.	Species	Locality	Stomach contents	Date (1926)
4	Rainbow	Merced River	Lady bird beetles; caddis cases; pubescent hoplia; wasp; aquatic dascilli; salmon eggs (bait)	June 24
1	Rainbow	Merced River	Salmon eggs (bait); Caddis fly larvae	June 28
6	Rainbow	Merced River	Caddis fly larvae in cases; crane fly larvae; grasshoppers; pubescent hoplias; stink bug; angleworm	July 6
3	Rainbow	Merced River	Lady bird beetles; oak tree hopper; click beetle; metallic wood borer; water strider; robber fly	July 15
3	Rainbow	Lost Valley (Merced Pool)	Black ants; crane fly larvae; predaceous ground beetle; lady bird beetles; pubescent hoplia	June 27
18	Rainbow	Crane Creek (El Portal)	Grasshoppers; Predaceous ground beetle; stone fly nymphs; stone flies (adult); whirligig; caddis fly larvae in cases; dragon fly nymph; wasps; click beetle; ten-Lined June beetle; darkling ground beetle; earthworm; water skater	July 1
4	Eastern Brook	Bridal Veil Creek	Black ants; Caddis fly larvae	July 4
13	Eastern Brook	Yosemite Creek	Darkling ground beetle; Lampyridae; click beetle; black ants; caddis fly larvae in cases; whirligig	July 5
10	Eastern Brook	Merced River	Lady bird beetles; mosquitoes	July 25
2	Rainbow	Babcock Lake	Empty	July 26
8	Rainbow	McClure Fork	Paridae; plant fragments	Aug. 3
2	Eastern Brook	Young's Lakes	One empty; lady bird beetle; caddis fly larvae	Aug. 5
8, 10	Loch Leven, Eastern Brook	Glen Aulin	Long horn borer; predaceous ground beetle; other insect fragments not identified; several stomachs empty	Aug. 7

Investigations indicate that in the valley—Merced River—and at El Portal—Crane Creek—where there is an abundance of vegetation and insect life, the trout have an abundance of food. We have not decided what significance this condition has for the angler. Do the trout strike at artificial flies more readily because they are accustomed to catching insects on the water or does the abundance of natural food make fishing more difficult? The stomachs of trout caught in the upper mountain streams have less in them. Black carpenter ants seem to be the chief article of diet. In the high mountain lakes insect food seems to be very scarce and most stomachs are entirely empty. The few which contained food had very little in them. Mr. Russell, park naturalist, reports catching fish in a High Sierra cirque and upon examining the stomachs found that they contained many small bivalve mollusks.

Since the remains of many small insects which may be seen floating on the surface of streams are found in the stomachs of trout, surface feeding of the fish is indicated. Inasmuch as some of the insects are more nocturnal in habits, as the predaceous ground beetle, a part of this

feeding may occur at night. Bits of cedar and pine needles in the stomachs indicate that the fish sometimes make a mistake in their judgments. The presence of caddis fly larvæ in cases, stone fly nymphs and crane fly larvae suggest that the fish obtain part of their food under water—sucking off whatever adheres to floating stems, plants, etc. It is interesting to note that lady bird beetles, which are apparently so ill tasting to birds and are avoided by them, form one of the chief sources of food for trout. Dragon fly nymphs sometimes attack young brook trout, as young as themselves; we are glad to find, therefore, that the trout occasionally reversed the situation and had a meal themselves.

Do we know any more about fishing because of this investigation? Practically all the fish examined were caught with Royal Coachman, a grey or brown hackle. As these bore little resemblance to the stomach contents, we have come to the conclusion that it is not the kind of bait you use here in Yosemite which counts, but the realistic way in which you make it alight on the water.—Helen Y. Howe and Avis Meigs, Yosemite Nature Notes, Vol. 5, No. 12, pp. 93-94.

GAME PROPAGATION IN OTHER STATES.

NEW YORK.

The Commission's game farm continued to operate during the year with that high degree of efficiency that has characterized their performances in the past, raising more crops and distributing more pheasants and pheasant eggs than were raised and produced during the previous year.

An erroneous belief, and one shared by many people, is that the game farms produce pheasants and pheasant eggs only; that is, the state game farms are wholly devoted to the production of pheasant eggs and pheasants. Thousands of chickens are each year raised on the game farms. These birds play no small part in the rearing of the pheasants. Pheasant eggs to be incubated at the farms are hatched under hens and cared for by them until arrival of distribution time. Mallard ducks are in a small way also raised on the Sherburne Game Farms. Beginning with a setting of eggs a few years ago, the farm has continued the work, each year liberating all ducks produced. These mallards have propagated and multiplied until there is now a permanent occupancy by them for miles surrounding the farms, the ducks nesting in this area and not migrating.

The paramount function of the farms is the production of pheasants and their eggs, but greater acreage is utilized in raising corn, wheat, buckwheat, oats, barley and beets than is used in the actual work of propagating the birds.

Pheasants can not be successfully raised on a farm where every acre is in the same year used by the birds. Where this has been tried failure always resulted. Much of the disease that attacks the birds is the direct result of allowing the ground to become contaminated through too long use. The best method of raising pheasants, and the one conducive of the best results, is that in use on the state game farms. The acreage used for rearing purposes this year will not be again used for three years. Meanwhile, it will be each year plowed and planted to corn, wheat, oats and such other crops as are usually raised on the average farm. In the year the acreage is to be again used as a breeding ground it is plowed and sown to grass.

The crops raised on the farms supply food for the pheasants and chickens, and forage for all domestic animals maintained on the farm, as well as providing a means of raising the young pheasants

under conditions identical with those they will find when liberated. The pheasants on the farm, except those kept for breeding purposes, are not kept cooped up, but are at an early age liberated in company of a hen to act as guardian until the chicks are able to shift for themselves. When this time arrives they are trapped up and sent to the parts of the state into which some person had, by filing an application, expressed a desire to have additional birds introduced.

The liberation of pheasants is not as a general thing done by the commission. The person applying for pheasants is the person to whom birds are shipped. The Commission will not honor any application that does not indicate the applicant is willing to pay the cost of a telegram advising of shipment, the express charges, and a willingness to do the actual work of liberating the birds upon arrival.

This is also true of applications for pheasant eggs. Applicant, unless application be made in the name of a game club, must assure the commission that ample facilities are had for the hatching out of the eggs under hens, and the young pheasants will be turned loose in covers adapted to their habits when of a size that will permit of liberation with reasonable safety. Game clubs desiring eggs sent in their care are obliged by the commission from time to time to visit the persons into whose care the eggs are intrusted for hatching, to see that they are being properly incubated and that the young chicks are being allowed free range with their foster parents. When the young birds have progressed to the stage where it is advisable to turn them loose, the clubs must see that the birds are liberated.

Many clubs assuming this responsibility have found that much better results can be gained by sending one or more representatives to the game farms to be instructed in the handling of eggs, setting of hens, and feeding of the young birds. This knowledge is in turn passed on to the members of the clubs so that when they commence the work of looking after the hatching of the eggs they know just how to go about the problem to accomplish the greatest good.

The 1926 season on the farms was a very successful one, and this in spite of the fact that much weather unfavorable to pheasant raising was experienced in the spring and early summer. Many privately owned farms reported a total loss of all birds this year. The state farms, however, suffered no trouble that was not overcome. There were 3200 breeders on the farms and in the second week of April the

first eggs arrived. By May 10 the birds were laying an average of 2200 eggs a day. This egg laying continued unabated through the summer until 141,079 eggs had been laid. The ratio of cocks to hens retained for breeding on the farms is one to five, so the average number of eggs laid by each bird was slightly more than fifty-five.

The first eggs to be produced on the farms were retained for hatching purposes. It was from the birds hatched from these eggs that additions were made to the breeding stock of the farms. From these birds 2041 of the most virile and healthy specimens were kept over for service next year. The remainder, 11,918 birds, were sent out to persons who had applied for them and who liberated them in covers that had been previously selected.

The cost of producing a pheasant and bringing it along to liberating age varies slightly each year. The average price per bird, following the prescribed method of figuring costs that has been adopted by other states, is found by deducting from the net operating expense of the game farms the value of the adult pheasants retained as breeders and the value of the pheasant eggs distributed. The remainder is chargeable to young pheasants distributed. The cost per bird is then found by dividing the number of birds distributed into these figures. Computed over a period of five or more years, the average price per bird produced on the state game farms and brought to liberating age is found to be about twenty-five cents.—Sixteenth Annual Report, Conservation Commission of New Jersey, pp. 86-90.

NEW JERSEY.

The total game distribution for the year was as follows: 18,428 pheasants, 12,937 being liberated from our farms; 3886 liberated as result of public distribution of eggs and 1605 purchased from dealers; 36 quail, 1029 Hungarian partridges and 10,483 rabbits.

With the first fall of snow a circular letter is sent to each warden requesting him to make every effort to locate and feed the game and to erect shelters and arrange with sportsmen, rural mail carriers and others to cooperate in the work. Every year more attention is being given to this matter by sportsmen and farmers, who have seen that at small expense a great amount of game can be preserved.

The wardens reported coveys found and fed as follows: Quail, 630 coveys, 6355 birds; English pheasants, 401 coveys, 5098 birds; Hungarian partridges, 71 coveys, 619 birds.—Annual Report of the New Jersey Board of Fish and Game Commissioners, 1925-1926, pp. 26-27.

PENNSYLVANIA.

More than \$275,843.44 has been expended during the biennium for the purchase and feeding of game. . . .

The amount spent for game purchased has been considerably larger than during any similar period in the history of the board. Purchase of deer for stocking purposes has been discontinued, and all of the funds that can be devoted to game purchases are being used to replenish our supply of small game. The big difficulty, however, is to secure native game birds, such as wild turkeys and ruffed grouse in quantities.

For the first time in the history of the board, steps have been taken to stock Hungarian partridges, which birds have done splendidly in a number of western states and Canadian provinces. From studies made by the president of the board and our executive secretary, we are convinced that these birds will thrive in Pennsylvania and will withstand our severe winters much better than will our native bobwhite quail. We find Hungarian partridges do not lend themselves to wide distribution in small numbers, and stocking must be confined to segregated areas. We have closed the entire state to the hunting of these birds for 1926, and if desirable will take action to give them further protection next year.—Biennial Report of the Board of Game Commissioners, of the Commonwealth of Pennsylvania, 1925-1926, pp. 9-10.

VERMONT.

Approximately 3600 pheasant eggs were set and 2090 birds hatched during the season of 1925. While the first 1000 eggs gave us a hatch of 70 per cent the rest of the hatches were very low, giving a hatching total of 58 per cent. Many of the birds hatched were weak. The low fertility and weak birds were evidently caused by the poor season. The number of birds shipped out totaled 1573. Owing to the fact that we had no fences around the rearing field many birds drifted away which we were unable to catch. The unusual amount of wild grapes, berries, etc., in the neighboring woods and fields offered them more than ordinary enticement. Vermin was very plentiful, causing us a heavy loss. Out of one hatch of 500 birds a loss of over 200 came when they were about three weeks old, due to their eating the yellow petals which dropped from the mullen plants. We moved them as soon as we found out what caused the trouble and saved the rest of the birds. A loss of over 100 came from a heavy storm in spite of the fact that the men worked all

night in the rain trying to save them.—Twenty-eighth Biennial Report, Department of Game and Fish, State of Vermont, p. 18.

RHODE ISLAND.

This commission receives occasional complaints for its failure in the past to operate a game farm, or to purchase in large quantities pheasants and other game birds and animals, but we feel, and we have felt for several years, that the most important work which we can do in conserving our bird and animal life is to preserve those animals native to our woods and fields. Most careful investigations have been made by the game departments of the various states to ascertain the success which has attended the importation of all sorts of game birds and animals into various states in this country. At one time quail were imported successfully, and in the far west the European partridge, commonly known as Hungarian partridge, has been imported and has thrived well and has increased tremendously in numbers. An effort to release such birds in this state was made several years ago. So far as is known, not one Hungarian partridge survived the second season, and that is the unanimous report of the game departments of every state east of the Mississippi River. If such is the universal finding, it would appear foolish to spend very much money for the importing of that bird. Quail can not now be bought from any state in this country and no private breeders are allowed to ship them, or could furnish them, if allowed. Mexican quail are procurable, but they come from a far warmer climate and this commission feels that they are not only unsuited to the rigors of our Rhode Island winters, but by interbreeding with our local stock, lower the vitality of native Rhode Island quail. Furthermore, while quail are, and probably always will be—at least for many years in the future—plentiful in the sections of our state close to the salt water, where the salt air prevents long accumulations of deep snow, we have in Rhode Island every four or five years a long, hard winter with deep snow, which means the certain destruction of every quail or other ground feeding bird in the sections of the state removed from the influence of salt water, except such as are fed by artificial means while the deep snows last. After such a season, in the course of time, quail begin to seed back into these sections and there are now very considerable numbers of quail in more remote sections of the state. It is only a question of time

when long continued heavy falls of snow will again reduce their numbers to the vanishing point and it will be necessary for us to start all over once more. Under these circumstances, the commission feels that, even if it could procure quail for planting, no permanent result would be gained thereby.—Biennial Report of the Commissioners of Birds, State of Rhode Island and Providence Plantations, 1926, p. 67.

MARYLAND.

Desiring to start the propagation of bob-white quail we decreased our broodstock of pheasants. Prior to August 15th, we raised approximately 3000 birds, but due to the extreme wet weather which brought on diarrhea, we were only successful in liberating 1180. We began the season with nine pairs of bob-white quail. On July 1st lost one hen bird which left eight pairs for propagation purposes. From these birds we collected 363 eggs; hatched 342 birds and on August 15th, we had in our pens about 300 at which time the rainy season came on, lasting more than ten days during which period we lost from diarrhea about 175 birds. At present we have around 100 bob-white quail raised at the game farm this season which we are holding as broodstock for the season of 1927. We have placed contracts for bob-white equipment and hope to increase our activities along this line tenfold during the coming season.—Fourth Annual Report of the Conservation Department of Maryland, pp. 74-75.

WEST VIRGINIA.

The State Game Farm, containing 327 acres, was first occupied late in the year 1924. The first propagation of game birds on this farm, however, was not begun until the spring of 1925. Birds previously distributed were reared on a nearly privately owned farm.

The first year's propagation of pheasants and other game birds on the new farm was considerably hampered by reason of crowded and imperfect quarters and construction disturbances caused in building. In spite of this, however, the superintendent of the farm had remarkable success in keeping down the diseases common to these delicate young birds and was able to bring through a high percentage of the pheasants, and to distribute 437 ring-necked pheasants to persons throughout the state. The greatest loss was suffered from the killing of the birds, both young and old, by vermin.

The year's experience shows the futility of undertaking game bird propagation without proper safeguarding against predatory animals and birds. The toll taken on the game farm includes 216 ring-necked pheasants, about 20 pair of Hungarian partridges, and several silver pheasants.—Fifth Annual Report of the Game and Fish Commission of West Virginia, p. 13.

SOUTH CAROLINA.

The last session of the legislature allowed \$5,000 to erect and maintain a game farm. This was a small amount to accomplish anything with. Nevertheless the results have been most satisfactory. I now have on hand a nice herd of deer, a good flock of wild turkeys, and several hundred English ring-necked pheasants. All of these were obtained after it was too late to do much along the line of breeding and raising, but next year I shall be able to put these species of game throughout the state, and if they are properly appreciated and protected, in a very few years all of the counties will be supplied with game. The method of distributing game is to allow any reputable landowner of this state to get game from the farm for the purpose of raising same. He will have to protect same for two or three years, during which time the game would have the chance to breed and increase on this particular piece of property, and eventually migrate all over the county. This is a system that has been used by other states and has been successful along these lines. I am positive that we are reaching a stage where we must replant what we destroy. By starting now, we can keep our state stocked with game without cost to anyone, except the hunters who buy licenses and the violators who pay fines.—Report of A. A. Richardson, Chief Game Warden of the State of South Carolina, 1923-1924, p. 5.

MICHIGAN.

In 1916 this department purchased a two hundred acre farm, seventeen miles southeast of the city of Lansing, now known as the Mason State Game Farm, and in the spring of 1917 we got started in a small way through the purchase of about two hundred stock ring-necks, most of them coming from the Oregon State Farm and the balance from California. These birds cost the department \$3.25 each; and a few eggs bought from private, licensed breeders cost us \$25 per hundred.

The work during 1917 and 1918 was somewhat of an experimental nature and

few birds were produced or liberated, although at the end of the period we had acquired a substantial breeding stock of birds and the necessary equipment. In the spring of 1919 we were fortunate in securing the services of an experienced game breeder from New Jersey, and since that time production of birds on the farm, alternated with grain crops as a safeguard against disease, has progressed satisfactorily and without interruption.

We think the sportsmen of Michigan will verify the statement that our efforts have proven fairly successful and that the ring-necked pheasant is thoroughly established, at least in southern Michigan; that they are a fine game bird and that they are putting a thrill into Michigan sports afield. Further than this, the open season on pheasants must attract thousands of hunters who otherwise would be turning their guns on the ruffed grouse that is sorely in need of all possible protection.

In 1926 there were 43,777 pheasant eggs laid on the farm. Of this lay 9000 were set and 7441 brought to maturity. State distribution numbered 30,040 eggs, the remaining eggs were used to feed young pheasants. Of mature pheasants reared, 5841 were distributed in state covert. Breeding stock was reserved to the number of 1600. Distributed in the lay for 1926 were 1000 eggs brought from Ohio for blood diffusion. Other birds reared on the farm were: wood-duck, 8; blackduck, 7; Canada geese, 14; mallard, 160.

Quail were reared to the number of 35. Five white-tailed deer fawns were received from northern wilds. Old breeding pheasants from previous year were released in wilds to the number of 735.—Biennial Report, Department of Conservation, State of Michigan, 1925-1926. pp. 28-30.

NORTH DAKOTA.

The Game and Fish Department first started to introduce the ring-necked pheasant as a game bird in 1915, and continued their efforts in subsequent years with indifferent success. A good many young birds were released in the fall of the year with no chance to become accustomed to looking out for themselves. Raised under hot-house conditions, as we might say, when turned out to rustle for themselves they quite naturally were bewildered by new conditions and were an easy prey to predatory animals and birds.

Many eggs were furnished farmers and others who wished to try and raise them

to be released on their farms. This is theoretically an ideal way to stock a covey, but it is seldom a success, for various reasons.

During the past three seasons we have turned out something over 1000 birds at a cost of approximately \$5 each. Where we found someone who would care for them during the winter, they were put out in the fall; otherwise in the spring, the preferable way, as then everything in nature tends to put the situation as regards food and weather in the best possible condition for good results.

Reports circulating from time to time over the state to the effect that the introduction of the pheasant will drive out or replace our native grouse do not appear to be based on facts, but rather on theory.

The pheasants furnish a lot of thrills to the sportsmen and have a place in our game life.—Eighth Biennial Report of the State Game and Fish Commission of the State of North Dakota, 1923-1924, pp. 14-15.

SOUTH DAKOTA.

In November, 1924, the Game and Fish Commission declared an open season on cock pheasants in 23 counties, ranging in duration from two to fifteen days, depending on the number of birds in the various counties opened. The wardens in charge of this hunt, as well as many of the hunters, declared this to be some of the greatest sport they had ever enjoyed in the state, it being estimated by supervisor of wardens, L. C. Hawley, that the number of pheasants killed during the season was about 250,000.—Sixteenth Annual Report, Dept. of Game and Fish of South Dakota, 1925.

MISSOURI.

Signal success was achieved in deer propagation, as approximately twenty fawns were added to the herd. A much better record is expected in future years as many of the deer purchased last year were little more than a year old. A feature in game propagation is the work being done by the department in replenishing the greatly depleted stock of wild turkeys. In this connection we want to call attention to three hundred head of the original blue head wild turkeys, which were purchased in the south and are now being propagated in specially prepared turkey refuges. This was done rather late in the year, but it is believed much success will be attained as the refuges contain an abundance of cover and they present ideal conditions for breeding. Turkeys have been placed in three refuges, each twenty acres in area. There is an abundant water supply. Native Missouri quail are

being propagated in the refuges and their numbers were increased. The ring-neck pheasant was also introduced in a small way at the refuge located at Big Spring State Park, Carter County.—Annual Report of the State Game and Fish Commissioner of Missouri, 1926, p. 52.

ARKANSAS.

It seems very unwise to inaugurate a broad program of game propagation in view of our present ineffective protective system. The department has never felt that it would be justified in spending any great amount of the money paid in by men who hunt and fish, for rearing and distributing game that could hardly be expected to dodge our many hunters and dogs through one of our present lengthy seasons. Should we have the necessary protection, however, it would be necessary that the department's income be increased before the extensive program demanded by our thousands of hunters could be launched.

Propagation work at the Rogers State Game Farm has gone along most satisfactorily. Ring-neck pheasants are the principal product, while a few bob-white quail are reared each year and a very good bunch of wild turkeys is being built up. Bob-whites have been planted in only one or two sections, generally on refuges created by groups of farmers, a majority of the ones reared having been exchanged with game wardens of other states for desired species or the eggs of same. Wild turkeys are reared so that propagation in considerable numbers can begin immediately on the passage of necessary protective laws.—Sixth Biennial Report, Arkansas Game and Fish Commission, 1926, pp. 9-10.

IDAHO.

A portion of the ring-necked pheasants shipped to Idaho in 1909 were liberated during the fall of that year in counties of low altitude, the balance being distributed through the state as far north as Bonner County during the year 1910. Unfortunately, the birds sent to the extreme northern counties, or where climatic conditions were unusually severe, did not survive. As a matter of fact, several years elapsed and there was practically little or no indication, even in favorable sections, that these birds were increasing, when suddenly, and after about five or six years, they seemed to appear everywhere and from nowhere in particular. From that time on and by reason of a closed season, they multiplied rapidly, so much so, in fact, that the legislature pro-

vided at first a short open season, with a bag limit of two, which has now been extended to thirty days, with a four-bird bag limit per day or in possession.—Tenth Biennial Rpt. of the Fish and Game Warden, Idaho, 1923-1924, p. 50.

Game birds now open to shooting at regulated seasons are the Chinese pheasant, Hungarian partridge, California quail, native quail or bob-white, sage hens and the blue, ruffed, pintail and Franklin grouse. The first three species have been introduced by the department and are not native of the state, the other game birds are natives and have not been propagated at the state game farms. The two state game farms have reared and liberated to date, 1249 Chinese pheasants, 61 Hungarian partridges. The farms have reared and retained for breeding purposes about 500 birds.—Eleventh Biennial Report, Fish and Game Warden, Idaho, 1925-1926, p. 29.

WYOMING.

The plan to stock the state with Chinese ring-neck pheasants and Hungarian partridges is in its infancy. We have about 200 stock pheasants that we are holding for next season. If the game bill is enacted and we are permitted to carry on our program we expect to propagate several hundred of these birds during the summer of 1927.

Last season we released 27 pair of Hungarian partridges, and it is our plan and intention to purchase and release a number of these wonderful game birds each year. They are prolific breeders and once they become adapted to climatic conditions they propagate very rapidly.—Biennial Report, State Game and Fish Commissioner of Wyoming, 1925-1926, p. 23.

OREGON.

Three game farms are now maintained by the commission, the eastern Oregon farm at Pendleton having been completed and put in operation during the present biennium. The establishment of this unit has made it possible to liberate a greater number of Chinese pheasants than heretofore possible.

Wild turkeys have been liberated in Oregon for the first time. Exceptionally good results were obtained at the Pendleton farm in rearing these birds and a number have been liberated in Curry, Jackson and Josephine counties. It was thought these counties furnished an environment more nearly like the country in which wild turkeys were originally found and for a time at least the effort to make this a game bird in Oregon will be cen-

tered in these three counties. If the turkeys can be established there, experiments will be made in other parts of the state.

The problem of raising Hungarian partridges in captivity has also apparently been solved by our game farm department under the supervision of 'Gene M. Simpson. It has always been considered impossible to handle these birds at a game farm. More than 800 of them were hatched at the Oregon game farms in 1926, most of them at Pendleton, and although the subsequent percentage of loss was higher than among pheasants approximately 400 birds are now being held for breeding stock and will serve as a nucleus for what is expected to be the beginning of an important phase of the game propagation. This year's heavy loss of young birds was due to overfeeding of rich foods. Lack of experience with the birds was responsible.

The Corvallis farm, the oldest in the state, the equipment of which has deteriorated to such an extent as to make it unsuitable for pheasant propagation without rebuilding, is being remodeled to accommodate Hungarian partridges.

Under the supervision of 'Gene M. Simpson the game farms have reached the enviable position of being pointed to as models by other state departments of game propagation. Neighboring states have asked his assistance in laying out their farms and have sought his advice in solving the problems with which they are confronted.—Biennial Report of the Game Commission of the State of Oregon, 1925-1926. pp. 11-12.

WASHINGTON.

The Hungarian partridge was first introduced in eastern Washington about 1897 and has seemed to prosper. The next liberation of which we have a record was in 1906, and then through many of the years which followed up to 1918, other liberations of this bird were made in various localities in what may be regarded as generous numbers, care always being exercised that the localities where this was done were favorable to the species. And invariably the birds were given full protection, there being no open season for a period of years. Finally, when this was allowed, it was at first a short one and the bag limit small. The result of this has been that the Hungarian has proved a success in eastern Washington nearly from the time of its introduction up to the present, for now there is hardly a county on the east side that does not afford the opportunity for good sport with it.

These birds seem to be admirably adapted to eastern Washington, especially

in districts where cereals are raised. I am told by a citizen here, who used to hunt these birds for the market in Austria-Hungary, that they are as individuals much better birds as to plumpness and size than the birds of Europe. This leads one to believe that our section of the country is so favorable to their growth and development that an improvement has been made by reason of this fact over their native country.

They are very hardy and prolific and are as contented in a patch of weeds, taking the seed for food, as they are in a wheat field. From personal knowledge I know that in some cases the female birds produce two coveys in one season. They lay anywhere from sixteen to twenty-four eggs. Usually a covey when hatched runs from fourteen to eighteen birds, and a few coveys are found where the old one has raised twenty.

From the standpoint of a game bird, I believe them to be the gamiest of them all. The law of the covey is very strong and when they flush all of them go at the same time. There seems to be less than a fraction of a second between the time the first one and the last one makes his get-away. They will always be able to take care of themselves since they become very wild when much shooting is done. When one is winged or slightly wounded so that he can not fly he will run a mile sometimes before a hunter's dog overtakes him.

During the winter months they come right into the towns and eat at the back doors of the residences. They will help themselves to straw stacks, hay stacks, and anything edible. At night they burrow in the snow, sometimes making little tunnels four or five feet long under two feet of snow. I have hunted upland game birds in the west covering a period of thirty-seven years, but I believe the Hungarian partridge, considered from every standpoint as a game bird, is the premier one of the Pacific coast.

In western Washington, judging from the past, it would appear doubtful that this bird will ever prove the success it has in the eastern part of the state, but even at that, it could by comparison fall quite far short in numbers and still its introduction would be regarded as not lacking in success.

This partridge has, therefore, proved a welcome addition to the game birds of our state, and in one way has helped to save our native ones. For since an open season in connection with it has been allowed, these latter have not been so persistently hunted as they formerly were, and as a consequence this has obviously proved to their advantage.—S. F. Rath-

bun, *American Game*, Vol. 15, No. 4, pp. 77-78.

NEVADA.

Forty-seven pheasant hens and fifteen cockerels were purchased for stocking the rearing-pens at the Nevada School of Industry.

The attempt to hatch birds at this school has proven a failure, and the commission recommend that future efforts in this line be conducted at the grounds

of the Verdi Hatchery where the hatching and rearing of the birds could be under the direction of a trained man. There is sufficient ground available at the Verdi Hatchery for such purpose.

Twenty-five pair of Hungarian partridges were purchased and liberated on the Recreation Grounds and Game Refuges in Elko and Churchill counties.—State of Nevada, Biennial Report of the Fish and Game Commission, 1923-1924, p. 15.



REPORTS.

VIOLATIONS OF FISH AND GAME LAWS.

October, November and December, 1926.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Angling License Act.....	8	\$150 00	-----
Violations of Commercial Fishing License Act.....	18	210 00	-----
Trout: over limit.....	9	225 00	-----
Salmon: illegal sale.....	1	-----	-----
Salmon: taking with spear.....	5	425 00	-----
Salmon: closed district.....	1	100 00	-----
Striped bass: undersized, over limit.....	9	255 00	-----
Striped bass: closed season.....	4	75 00	-----
Crabs: transportation from district 1½.....	1	180 00	-----
Crabs: closed season.....	2	45 00	-----
Clams: undersized, over limit.....	34	705 00	425
Abalones: undersized.....	15	400 00	-----
Lobsters: undersized.....	15	465 00	-----
Illegal fishing: within 250 feet of fishway, 150 feet of lower side of dam.....	11	100 00	-----
Illegal night fishing.....	5	125 00	-----
Killing fish with explosives.....	3	200 00	-----
Water pollution.....	2	300 00	-----
Nets, traps, lines: illegal possession or use.....	8	300 00	125
Totals.....	151	\$4,260 00	550

SEIZURES OF FISH AND GAME.

October, November and December, 1926.

Ducks.....	649
Geese.....	43
Shore-birds.....	9
Doves.....	6
Pheasants.....	4
Quail.....	224
Non-game birds.....	122
Deer meat, pounds.....	1,516
Doe hides.....	1
Fawn hides.....	1
Buck heads.....	1
Spike bucks.....	1
Rabbits.....	25
Squirrels.....	2
Trout.....	471
Striped bass, pounds.....	516
Salmon, pounds.....	1,400
Clams.....	954
Crabs.....	1,358
Crab meat (out of shell), pounds.....	180
Shrimp meat, pounds.....	15
Abalones.....	103
Lobsters, pounds.....	689
Crawfish.....	86
Nets.....	2

GAME CASES.

October, November and December, 1926.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Hunting License Act.....	74	\$1,140 00	100
Deer: closed season.....	23	885 00	
Deer: does, fawns or spiked bucks.....	15	850 00	
Deer: failure to retain horns and hide.....	4	450 00	
Deer: evidence of sex removed from hide.....	1	50 00	
Ducks: illegal killing or possession.....	5	175 00	210
Ducks: possession or killing of wood ducks.....	11	100 00	
Geese: sale of.....	3	50 00	
Geese: over bag limit.....	3	50 00	
Swans: possession or killing.....	5	150 00	60
Cranes: possession.....	1	50 00	
Doves: closed season.....	11	233 00	
Wild pigeons: killing or possession.....	5	210 00	
Shorebirds: killing or possession.....	7	175 00	
Quail: closed season.....	57	2,063 00	90
Pheasants: closed season.....	5	425 00	
Sage hens: over bag limit.....	1	50 00	
Rabbits: cottontail, brush, Sierra hare, closed season.....	18	450 00	
Squirrels: tree; closed season.....	6	160 00	
Non-game birds: killing, possession.....	49	1,605 00	10
Bird nets, traps: illegal possession or use.....	6	175 00	
Game refuges: hunting, possession of firearms.....	2	50 00	
Trespass.....	6	135 00	
Shooting game from automobile, power boat.....	11	280 00	
Night hunting.....	23	400 00	200
Fur trapping regulations.....	3	20 00	
Totals.....	355	\$10,481 00	570

STATEMENT OF INCOME.

For the Period October 1, 1926, to December 31, 1926, of the Seventy-eighth Fiscal Year.

License sales:	Detail	Total
Angling.....	\$68,220 50	
Hunting.....	108,668 30	
Market fishermen's.....	6,750 00	
Trapping.....	2,406 00	
Wholesale fish packers' and shell fish dealers'.....	315 00	
Game breeders'.....	17 50	
Fish breeders'.....	20 00	
Kelp.....	10 00	
Total license sales.....		\$183,707 30
Other income:		
Court fines.....	\$19,608 56	
Fish packers' tax.....	15,930 95	
Fish tag sales.....	1,673 21	
Game tag sales.....	37 80	
Miscellaneous sales.....	269 75	
Interest on bank deposits.....	615 09	
Total other income.....		\$38,135 36
Total income.....		\$224,842 66

STATEMENT OF EXPENDITURES.

For the Period October 1, 1926, to December 31, 1926, of the Seventy-eighth Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Executive and legal		\$3,830 00	\$509 60	\$118 50	\$4,458 10
Clerical and office	\$271 58	4,468 22	568 34	142 39	5,480 53
Rent			2,454 73		2,454 73
Telephone and telegraph			824 73		824 73
Postage			529 36		529 36
Freight, cartage and express			202 98		202 98
Printing	3,216 55				3,216 55
Automobiles	73 24		140 15		213 39
Accident and death claims			1,370 74		1,370 74
Total administration	\$3,561 37	\$8,298 22	\$6,630 63	\$260 89	\$18,751 11
Education and research:					
Director and assistants	\$7 91	\$1,725 00	\$318 21	\$9 00	\$2,060 12
Publicity:					
Director of publicity		\$825 00	\$235 76		\$1,060 76
State Fair exhibit	\$5 00	28 00	34 36		67 36
Total publicity	\$5 00	\$853 00	\$270 12		\$1,128 12
Conservation and protection (patrol and law enforcement):					
Chief and assistants		\$2,169 98	\$271 51		\$2,441 49
Clerical and office	\$43 43	1,073 07		\$93 31	1,209 81
Rent			80 64		80 64
Captains and deputies	297 71	38,346 42	28,827 84	10 88	67,482 85
Patrol launches	357 41	527 23	162 30	107 26	1,154 20
Automobiles	211 00		22 65		233 65
Statistics and game problems (protection)	2 35	490 00	59 34	5 35	557 04
Lion hunting		405 00	223 81		628 81
Lion bounties			1,360 00		1,360 00
Total conservation and protection	\$911 90	\$43,011 70	\$31,008 09	\$216 80	\$75,148 49
Commercial fisheries:					
Chief and assistants	\$107 16	\$3,879 48	\$439 55		\$4,426 19
Deputies	1 10	4,796 64	1,787 35		6,585 09
Laboratory research	91 31	5,692 74	726 02	\$436 29	6,946 36
Statistical	2 40	960 00	47 87		1,010 27
Patrol launches	591 54	255 00	65 72	17 65	929 91
Salmon tagging	288 00	143 33	297 42		728 75
Botulism			3,750 00		3,750 00
Total commercial fisheries	\$1,081 51	\$15,727 19	\$7,113 93	\$453 94	\$24,376 57
Fish culture:					
Chief	\$5 15	\$949 98	\$63 65		\$1,018 78
Clerical and office	15 06	960 00	7 45	\$3 09	985 60
Special field investigation	4 32	2,073 95	395 29	4 80	2,478 36
Hatcheries	6,575 90	19,114 43	1,898 22	286 09	27,874 64
Hatcheries, additions and betterments				19,759 94	19,759 94
Automobiles	947 80		372 69		1,320 49
Rent			79 70		79 70
Total fish culture	\$7,548 23	\$23,098 36	\$2,817 00	\$20,053 92	\$53,517 51
Firearms, ladders and pollution:					
Chief and assistants	\$2 51	\$1,905 00	\$493 76		\$2,401 27
Game propagation:					
Game farm	\$423 28	\$1,882 04	\$381 21	\$205 12	\$2,891 65
License commissions			\$19,404 40		\$19,404 40
Total expenditures	\$13,541 71	\$96,500 51	\$68,437 35	\$21,199 67	\$199,679 24

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1926.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte Humboldt	Mendocino, Sonoma, Lake...	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro...	Mexican, brought into California via San Diego...	Total Mexican brought into California
Albacore								120	116,835		4,132		81	121,228			60
Anchovies									450		2,664			3,114			
Barracuda									21,318	4,759	71,947	6	51,909	149,639	442,918	97,337	540,305
Bluefish																	
Boreacuto									1,233		220,985	10	11,777	234,005	110,756	13,576	124,332
Bonito											8,657			16,046			
Carp				638	4,881	1,850								87,989			
Catfish				11	45,649	28,846											
Chilipepper																	
Cutus Cod	323	10,140					103,758	13,651	37,944	221	35			166,032			
Dolphin																	
Eels	2,238	83,690				429	125,350	9,695	8		210			221,640			
Flounders							71,140	2,955			7,807		33,766	115,668			
Grayfish																	
Greenfish							4,427							4,427			
Hake	30,267						4,772	257	162	60,218	52,076	1,064	9,913	158,729		19,868	19,868
Halibut														21,247			
Hardhead							61,034						11,874	83,167			
Herring	626		8,143			470	16,280	10,044	11,188		119,190	18	2,429	159,149			
Kingfish								933	192,787	40	652,470	23,831	126,815	996,876		10,271	10,271
Mackerel									30,664		96,882			127,546	1,378	5,475	5,475
Mackerel, Horse													3,389	3,870		2,580	3,077
Mullet										218	21,792	42	328	43,731	497		
Pike	1,094	115	5,843			11	14,613	1,675						1,378			
Pompano				48	711	619					1,029			1,029			
Rock Bass										60	57,238	24,520	15,894	97,712	260	40,119	40,379
Rockfish	45,688	1,041					154,337	281,509	290,902	29,386	845,598	5,073	197,598	1,831,492	2,224	2,224	
Sablefish							31,843		1,991	129	477	20		34,430			
Salmon	112,904	11,700		20,097	21,235	12,174	215,112	16,610	532		3,344	5		166,410			
Sardinas							4,381,665	1,500	59,716,924		27,101,134			247,303			
Sardines											28,896			91,303,919			
Sculpin										878	28,896	88		2,373			
Sea Bass—Black											6,498			31,357			
Sea Bass—White											3,876			3,306		106,586	109,892
Sea Trout			969				20,908	735	24,392	39,610	26,035	554		164,709	165,710	75,311	241,021
Shad																	
Shad—Buck				4,538	40	4,729								9,367			
Shad—Roe						86								86			

A CORRECTION.

In the January, 1927, issue of CALIFORNIA FISH AND GAME, the California Fresh Fishery Products Report for the months of July, August and September, which appeared in the January issue should be corrected to read as follows:

Del Norte-Humboldt Counties: Salmon 1,522,388 lbs.; total 1,770,408 lbs.

Marin County: Perch 8,611 lbs., Sea Bass, White, 42,946 lbs., Smelt 6,272 lbs.; total 420,744 lbs.

Solano-Yolo Counties: Salmon corrected to 187,809 lbs.; total catch for district 192,992 lbs.

Sacramento-San Joaquin Counties: Catfish corrected to 20,041 lbs., Salmon 245,134 lbs.; total catch for district 268,131 lbs.

Alameda-Contra Costa Counties: Salmon 385,128 lbs., Striped bass 73,493 lbs.; total 498,679 lbs.

San Francisco-San Mateo Counties: Mussels 3,259 lbs.; total 4,963,484 lbs.

These corrections were made on account of delayed reports having reached this office after the original report was made up for publication.

